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# ECONOMIC GEOGRAPHY

## APRIL

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Roberta P. Wakefield

POOTU, A LOST ISLAND
Liu En-lan

FIXATION OF SHIFTING CULTIVATION
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WACHUSETT RESERVOIR, A METROPOLITAN WATER SUPPLY
Minnie E. Lemaire

FACTORS IN THE ECONOMIC DEVELOPMENT OF BALTIMORE, MARYLAND
Pearle Blood

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## CUBA

FERTILE, tropically moist and warm, potentially productive and populous perhaps beyond the reach of the imagination, Cuba stretches her verdant expanse athwart the mouth of the Gulf of Mexico and the political vision of Washington. Her varied stores of natural resources —sugar, tobacco, iron ore, and a multitude of others—constitute a bonanza of economic wealth that makes her a coveted treasure for development and exploitation by envious powers.

For three decades or more the history of Cuba has been inextricably interwoven with that of her nearest and most powerful neighbor, our United States of America. Politically and economically her future can not be distinguished from that of her vigorous sponsor and protector. With no wish to subjugate her freedom to the sovereignty of their own great land, Americans guarantee her security from invasion, safety from subjection. They recognize her as dependent upon them for progress and prosperity, for peace and the high privilege of autonomy.

Stability of government, purposeful orientation of development, cooperation instead of dissension, the will to make of her fecundity a garden instead of a wanton riot of wilderness, must be achieved by Cuba's folk before they can realize the glory of the heritage that is theirs.

Friendly association with the United States in the arts and sciences, in the humanities and materialisms, in the promotion of trade and the progress of culture,—this is the way forward for the people of Cuba: but the people of the United States in their power and self-sufficiency must go more than half way toward that association.

ECONOMIC GEOGRAPHY

VOL. 13 APRIL, 1937 No. 2

# SOME FACTORS IN CUBA'S FOREIGN TRADE

*Roberta P. Wakefield*

THERE are any number of factors influencing Cuba's foreign trade, upon which a book could easily be written. It is, therefore, necessary in an article of this length to select only a few of the more important ones, and then to touch but lightly upon the outstanding features of those few.

The island of Cuba is the largest of the West Indies and, commercially, the most important. Including the Isle of Pines, the Republic has an area of 44,-164 square miles and from east to west it is about 735 miles in length. It lies just south of Florida and the Tropic of Cancer and stretches in an irregular crescent northwest and southeast, a narrow strip averaging about 61 miles in width. With no point more than a few miles from the coast, it has an even, healthful climate, without extremes of temperature. This, with the carefully enforced sanitary regulations, has developed its tourist trade remarkably and greatly increased the revenue of the country.

The proximity of Cuba to the United States makes it a natural playground for traveling Americans, with similar vacations by Cubans in the United States, which creates a spirit of friendliness, neighborliness, and sympathetic understanding between the two peoples, and its geographic position gives it great strategic importance from a purely political standpoint. The northwestern curve from Habana to Cape San Antonio fills in about one-third of the entrance to the Gulf of Mexico, with the Straits of Florida on the north and the Yucatan Channel on the west about equal in width, or approximately 100 nautical miles each to the Cuban coast.

The Cuban coast, about 2,500 miles in length, is much indented, with a remarkable number of fine harbors and anchorages. There are, however, many coral reefs, chains of islets, and corral keys which fringe much of the island on both the north and the south, make navigation difficult and dangerous, and in some places prevent access to the coast. The outstanding fine harbors and bays are Honda Bay, Habana Harbor, Santiago de Cuba Harbor, Cardenas Harbor, Cienfuegos Bay, Guantanamo Bay, Manzanillo Bay in Guanacayabo Gulf, Nipé Bay, Nuevitas Bay, the Matanzas Harbor and Puerto Tarafa. With the exception of Matanzas, all of these harbors are pocket-shaped which increases their security and defensibility.

The Island of Cuba is divided into six provinces: Habana, Pinar del Rio, Matanzas, Santa Clara, Camaguey, and Oriente.

Habana, the smallest in area, is thickly settled, with many plantations and small towns. The province is mostly flat or rolling with occasional hills, devoted largely to agriculture. The city of Habana, the capital of the Republic, is also the seat of government of the province. Its harbor is large and beautiful and well protected from storms. About two-thirds of the imports into the island are cleared through

its port, and about one-fifth of all the exports, including most of the tobacco, goes out from its wharves. It is the largest city on the island, having a population of 550,088.[1] In addition to its commercial importance, it is also an industrial center. Regular steamers serve this port from New York, New Orleans and Florida Ports which are nearby, and the steamers from the west coast of the United States, coming through the Panama Canal, make regular calls at Habana. There is also service from Habana to Mexico, to Central and South America, and to European and other world ports. Batabanó on the southern coast of Habana province has a population of 17,765 and is the seat of the sponge fishing industry. Giant turtles are caught also in this vicinity.

Pinar del Rio, lying west of the Province of Habana, has valuable mineral deposits and grows the finest grades of tobacco. It is famous for its cigars and leaf tobacco, the foothills and valleys of the southern slopes of the Organ Mountains being particularly adapted to the growth of the fine leaf known as Vuelta Abajo. Fresh vegetables are also an important crop of the province. There are no large towns or cities in this province; even the town of Pinar del Rio, the seat of government of the province, has a population of only about 63,379.

Matanzas Province, lying to the east is just larger than Habana, with an area of 3,260 square miles. It is highly cultivated, with sugar as the predominant crop, and henequen as another important product. The seat of government is at Matanzas, which has an excellent harbor on the northern coast, and is growing in importance as a shipping point for exports, notably sugar. It is about 50 miles east of Habana and has a population of 70,377. The government of Cuba has in process of development a plan for a "Free Port" area there. Cardenas, the fourth ranking port of Cuba, is also in this province, with a population of 41,080. Sugar and henequen fiber are exported through this port.

Santa Clara Province is in the center of the island, of less area (8,260 square miles) than the two larger provinces, though considerably larger than the three already described. It has large sugar and tobacco plantations and rich grazing lands. It is second in the production of coffee. Cacao is also grown to some extent. Cienfuegas, an important port on the southern coast, has a magnificent harbor and a population of 89,225. The capital of the province is Santa Clara, an inland city of 97,777 souls, on two railroads, one crossing Cuba from north to south and one from east to west. It is an important sugar and tobacco center. Trinidad, one of the oldest towns in Cuba, settled 1714, is an outlet for sugar and molasses, tobacco, honey, fruits and vegetables. Sancti Spiritus, also on the southern coast, is a larger town and a center of the sugar and cattle trade.

Camaguey Province, area 10,070 square miles, also has rich grazing lands, fruit farms, sugar plantations, and fine forests with an abundance of cedar, mahogany, and other important woods. Camaguey, the capital of the province, has a population of 133,309 and is a distribution point for plantation supplies and products. Nuevitas and Puerto Tarafa, on the northern shore, are important sugar ports.

The largest province is Oriente on the extreme east with an area of 14,188 square miles. It is mountainous with rich mineral deposits (copper, iron, and manganese) and vast forested areas to the south, and on the north are plantations and fruit farms. Santiago de

[1] The Cuban national census office figures for Dec. 31, 1935, are used in statements of population.

Cuba (population 103,961), is the capital of the province. It has an important trade with other Cuban ports and with the interior, and also with the United States and certain European ports. The mines are located near Santiago and its prosperity depends largely upon mineral ore exports. Cigars, leaf tobacco, coffee, cacao, sugar, rum, and cabinet woods are also important exports from this port. There are several industries located in Santiago, notably foundries, soap works, cigar factories, and tanneries. Quantanamo (population, 65,558) and Manzanillo (population, 63,835) on the south coast, and Antilla (population, 21,039) on the north have excellent harbors and are commercially important.

FIGURE 1.—Boat Races, Harbor of Habana, Cuba. (Courtesy of Bureau of Foreign and Domestic Commerce.)

The Isle of Pines (area, 1,180 square miles), a part of the Republic of Cuba, is noted chiefly for its early fresh vegetables and grapefruit which are mostly exported to the United States.

## IMPORTANCE OF AGRICULTURE

Its alluvial soil and mild humid climate make Cuba essentially an agricultural nation, and upon the yield of the sugar crop, and the price obtained for it, depends her ability to take foreign manufactured goods, although there are several other agricultural products of great importance. Tobacco is the second crop in value, with fresh fruits and vegetables ranking next. There is also a considerable stock raising industry and 8,000 or more acres are devoted to the production of henequen. Coffee and cocoa are grown to some extent and a small percentage of Cuba's requirements of rice is of domestic production. Butter, cheese, eggs, honey, and oil seeds are among the other agricultural products of increasing importance, and the recent increase in the production of rice, corn, and coffee has been of great assistance to Cuban finances.

Although strenuous efforts have been put forth to stimulate various manufacturing industries and to encourage greater diversification of agricultural products, the prosperity of Cuba and the purchasing power of her people still depend largely upon sugar, and these efforts, although relieving the situation to a minor degree, have succeeded only to a limited extent in diminishing the nation's dependence upon the funds received for the sugar crop and to a less

degree upon receipts for the tobacco crop. The growing importance of the fresh fruit industry, up to the time of the last period of depression, probably made up in some degree for the low price of sugar and helped to keep the balance of her foreign trade favorable except for the one year, 1921. As is the case with most of Cuba's exports, sugar, molasses, leaf tobacco, and fruits and vegetables are largely taken by the United States.

### CUBA FAMOUS FOR QUALITY OF TOBACCO

As already stated, tobacco is Cuba's second crop in importance. At the same time it is the product for which it is most famous. The greater part of the finest quality leaf is grown in the Province of Pinar del Rio, the balance being grown mostly in Habana and Santa Clara Provinces. The finest and most famous leaf, that from which the highest grade Habana cigars are made, known as Vuelta Abajo, is grown in the western provinces, and is largely consumed in the Habana factories, while the Vuelta Arriba or Remedios is largely exported as filler tobacco. Exports of wrapper leaf are always small in comparison with exports of other leaf, and in the same way the value of exports of cigars overshadows that of exported cigarettes. The United States is Cuba's best tobacco customer, but the United Kingdom and Spain also have been important markets for Cuban leaf and manufactured tobaccos. Tobacco exports are relatively stable, though over a period of years a considerable increase is shown. In 1920 the value of tobacco exports was higher than at any time since Cuba became an independent nation. There was an increase of 131 per cent over 1899 exports, and a slight increase over the second best year, 1919, the values being over $21,000,000 in 1899, $47,700,000 (about) in 1919, and $48,700,000 in 1920. By 1929 the value had dropped to around $37,900,000, but was still an increase of 80 per cent over the 1899 figure. During the next six years the value of tobacco exports slumped noticeably, due to the world economic crisis. In 1930 it was only $23,466,000, in 1931, $22,847,000, reaching the low value of only $12,850,000 in 1932. Since 1932 there has been a slight increase in value each year, but it is still less than the value in 1899.

Exports to the United States were heavier in 1935, and Germany took an increased amount which compensated somewhat for the decline in exports to the United Kingdom and Spain. Larger shipments also went to Puerto Rico. The United Kingdom was Cuba's best customer for cigars up to 1919 when it yielded to the United States with a heavy decrease in imports of cigars by 1923, though in 1925 the United Kingdom still bought more of Cuba's high priced cigars. She took about one-third of the total exports of cigars in 1931, but in 1933 and 1934 her imports of Cuban cigars had been so far reduced that Panama, the Canary Islands, Argentina, and Peru far outranked her, and exports of cigars to Gibraltar, the Netherland Indies, and Portugal even exceeded those to the United Kingdom, with the United States still farther down the line.

### LIVE STOCK INDUSTRY IMPORTANT

The center of the livestock industry, the third in importance in Cuba, is in Camaguey Province. Extensive grazing lands are also in Oriente and Santa Clara Provinces. Improved breeding stock are imported to raise the standards of the herds, and the duty on jerked beef, butter, and cheese have been increased as a protection to the industry. The number of livestock in 1933 was estimated to be approximately 4,855,000 head of cattle of all kinds, 619,000 head

of horses, 74,000 mules and asses, and 150,000 hogs. A very few head of live horses and cattle are shown in Cuban export statistics, but cattle hides are an important item, going largely to Germany with the United States, the next best market for hides, taking only about one-tenth as much.

In 1913, Cuban exports of cattle hides were valued at $2,452,000; in 1926, at $1,544,000; in 1928, at $2,382,000; in 1930, at $1,409,000; in 1931, at $1,165,000; in 1932, at $427,000; in 1933, at $583,000; and in 1934, at $604,000. The countries of destination to which the smaller amounts go vary greatly from year to year. For example, in 1933, Belgium, France, Netherlands, Poland, and the United Kingdom took small quantities, but none in 1934, and in 1934 Czechoslovakia, Finland, Italy, Sweden, and Lithuania imported small quantities, but none in 1933. Small quantities of shark and crocodile skins are exported to Netherlands, Germany, and the United States.

Small amounts of horn, honey, hoofs, and hair are exported to the United States, Germany, and Italy.

## EXPORT OF FRUITS AND VEGETABLES

Cuba's early crop of fresh fruits and fresh vegetables comes in just ahead of most of the similar crops in the United States and supplements the early supplies for the northern towns and cities of the United States grown in Florida and southern Texas. Bananas and pineapples predominate in the exports of fruit to the United States; the seasons and rain supply govern to some extent the quantity available for export. Grapefruit and avocados are also important fresh fruit exports. Tomatoes are the most important of the fresh vegetables, but pimentos, potatoes, eggplants and okra are also shipped for the United States winter trade. The fruit industry was adversely affected by the drought in 1935, especially pineapple and avocado production, but exports of fresh vegetables increased over the 1934 figures. The American Commercial Attaché at Habana reported that 64,341,869 pounds (net) of fresh vegetables were sent to the United States as compared with 61,486,042 pounds in 1934. Tomatoes continued to be the most important vegetables shipped from Cuba, but exports of cucumbers, eggplants, lima beans, okra, potatoes, and pimentos also increased.

Even with the emphasis in Cuba upon her sugar and tobacco production, she supplied the United States with 4 per cent by value and 4.8 per cent by quantity (bunches) of her imports of bananas in 1928, Honduras ranking first as supplier of bananas, and in 1932 Cuba had increased her banana exports to the United States to 7.4 per cent of the total value of United States banana imports and to 4.8 per cent by value. At that time, while both Honduras and Cuba had increased their banana export to the

TABLE I

CUBAN EXPORTS OF FRESH FRUITS AND VEGETABLES

(Thousands of Dollars)

| *Articles* | *1928* | *1930* | *1931* | *1932* | *1933* | *1934* |
|---|---|---|---|---|---|---|
| Avocados | 85 | 195 | 158 | 143 | 71 | 56 |
| Grapefruit | 263 | 358 | 356 | 239 | 90 | 195 |
| Pineapples | 957 | 1,660 | 1,292 | 1,045 | 745 | 812 |
| Bananas | 1,187 | 1,542 | 790 | 1,393 | 662 | 1,429 |
| Lima Beans | 56 | 85 | 98 | 101 | 105 | 68 |
| Tomatoes | 619 | 2,960 | 514 | 507 | 413 | 540 |
| Okra | 21 | 34 | 37 | 36 | 31 | 21 |
| Eggplant | 121 | 150 | 84 | 75 | 37 | 51 |
| Potatoes | 212 | 86 | 50 | 27 | 39 | .... |
| Pimentos | 147 | 80 | 66 | 26 | 3 | 26 |

NOTE.—The value of exports for 1935 and 1936 is not yet available.

United States, Jamaica, Costa Rica, and Guatemala, the other three suppliers, had lost ground to them.

### INCREASE IN COFFEE PRODUCTION

Cuba has come a long way in her ability to fill her coffee cup with brew from her own berries. As late as 1927 she was importing 67 per cent of her requirements and by 1931 she had entered the export market with a few thousands of dollars worth of coffee, though her coffee imports were still at the considerable figure of about $302,000. She was exporting coffee to France, Spain, and the United States (largely) during the years 1933 and 1934, in the amounts of about $577,000 and $251,000 respectively, with imports reduced to less than $15,000 for those years. As an aid to the coffee industry, the government in 1934 established the Cuban Institute for the Stabilization of Coffee with a declared function of studying all phases of the coffee industry, the cultivation of the crop, grading of the product, warehousing, financing, marketing, price stabilization and other aids to the coffee grower, such as the regulation of sales, combating adulteration and contraband sales, and the dissemination of scientific information regarding coffee growing.

In July, 1935, exporters of coffee were required to obtain export permits from the stabilization institute, and owners of raw coffee were compelled to withhold from the market one-fourth of their stocks of each class of coffee, disposal of the retained stocks to be made only through the Institute for the Stabilization of Coffee. In April, 1936, a general reorganization of the coffee-control system was undertaken, the Institute was suspended, and its functions transferred to the Cuban Department of Agriculture. The organization of the Coffee Exporters' Coöperative was authorized, also the fixing of minimum prices to the farmer for unhulled coffee, with maximum and minimum prices for the disposal of coffee by hullers, warehousemen, roasters, and other middlemen dealing in coffee. The portion of coffee to be withheld for exportation was increased to 50 per cent of individual holdings, and the President was given authority, in his discretion, to require an even greater percentage to be withheld after April 4, 1936, and the Department of Agriculture was authorized to fix in April of each later year the percentage to be withheld for exportation, to be based upon official estimates of the crop and upon the requirements for national consumption. To provide funds for the operation of the coffee control organization, a series of licensing and processing taxes on coffee were established. These taxes, however, were suspended temporarily until full regulations could be issued.

In June the Exporters' Coöperative was dissolved, the subsidy granted the organization was ordered returned to National Treasury, and the 25 per cent of the coffee stocks acquired to be withheld for export were ordered to be placed in bonded warehouses, and certificates of deposit were to be accepted by banks of the Clearing House Association. Owners are allowed to export their warehoused coffee only under special permit, and if not exported within 120 days, the Stabilization Institute or the Department of Agriculture acting for it, may effect its exportation. In July, 1936, full regulations for the collection of processing and license taxes became effective.

In September, 1936, the reorganized Institute for the Stabilization of Coffee, which had been temporarily suspended, began functioning. It is composed of 25 members—15 growers, 2 coffee hullers, 2 financial backers, 2 coffee ware-

FIGURE 2.—Tobacco Field. Vuelta Abajo, Pinar del Rio Province, Cuba. (Courtesy of Office of the Commercial Attaché, Embassy of the United States, Habana, Cuba.)

housemen, 2 roasters, and 2 exporters. Thirty per cent of all unhulled stocks of the 1936–37 coffee crop are to be retained for exportation and the Institute is empowered to arrange for the disposal of the crop after hearing representations by the growers and producers.

## MINERAL RESOURCES

In comparison with world production and consumption, the output of the Cuban mining industry is not large. Nevertheless, it is of great importance to the country. Although in the very early history of the island, the copper mines near Santiago were outstanding producers, at present they are of a relatively slight importance among Cuba's exports. New copper mines have been developed in Pinar del Rio Province, which are now being worked at a high capacity. The United States takes all of Cuba's exports of copper concentrates which are about one-fourth of her total imports of this metal. Cuba was second to Mexico as a source of United States copper imports in 1928, and to Canada in 1932.

Iron and manganese operations have grown in importance in recent years. The chief centers of iron ore production are the mines near Santiago on the southern coast of Oriente and near Nipe on the north coast. Iron deposits are also worked in Santa Clara and Camaguey Provinces. Manganese ore is mined near Santiago in Oriente Province. Numerous deposits of asphalt are found in Matanzas Province, near Habana, on the bay of Mariel, and in other places in Pinar del Rio and Santa Clara Province. Some chrome is also mined for export. Other mineral deposits, including petroleum, have proved of no great value.

## ECONOMIC UPS AND DOWNS

Cuban economic history is made up of a series of short periods of prosperity with depression always just in the offing.

TABLE II

EXPORTS OF MINERAL PRODUCTS FROM CUBA [1]

| *Item* | *Unit* | *1913* | *1926* | *1927* | *1928* | *1930* | *1931* | *1932* | *1933* | *1934* | *1935* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ores: | | | | | | | | | | | |
| Iron | met. ton | 1,618,261 | 541,055 | 276,991 | 53,149 | 25,001 | 116,126 | 35,602 | 158,475 | 121,749 | 191,000 |
| Copper | met. ton | 23,732 | 26,330 | 45,075 | 69,862 | 61,133 | 51,858 | 21,607 | 24,322 | 31,300 | 24,637 |
| Manganese | met. ton | ..... | 24,652 | 129,753 | 85,698 | 2,114 | 6,596 | 19,177 | 41,512 | 67,728 | 50,582 |

[1] Statistical data from Cuban statistics, mostly as consolidated in Foreign Commerce Yearbooks, prepared by the Bureau of Foreign and Domestic Commerce, United States Department of Commerce.

NOTE.—Export figures for 1936 are not yet available.

All of these exports were cleared for American ports.

The banner years during and just after the World War were followed by the crash of 1921–22, probably in some ways the worst in recent years. After the flush years of war-time, there was a period of unprecedented buying by Cuban importers as is shown by the fact that imports in 1919 were about $62,000,000 more in value than in 1918, and again in 1920 the 1919 figures were exceeded by over $200,000,000. Just then the price of sugar dropped suddenly and with catastrophic effect from a record of 23.5 cents per pound in May, 1920, to 3.4 cents in December of the same year, and to 1.8 cents a year later, with about one-third of the entire 1920–21 crop (1,400,000 tons) undisposed of. As a result, many mills were financially embarrassed and many others were sold at auction. Adding to the situation, the banking system broke down and a number of banks had to be liquidated. Many merchants, already heavily in debt, were unable to meet their obligations and could not take delivery of the goods which they had ordered, a great deal of which were late in arriving because of the inability of the shippers to fill the heavy orders promptly. They found themselves unable to dispose of this overstock of goods, even when offered at reduced prices.

In the resulting confusion, all Cuban ports, and particularly the port of Habana, became so congested from failure to clear the goods which could not be delivered, that the government was forced to remove them to bonded warehouses. Unfortunately, precautionary measures that would have made it easy to locate the goods later, were not taken at time of removal. Under the then existing law, duties had to be paid before the merchandise could be cleared either for consumption or for reëxportation. As a result, the losses to American shippers from forced sales for collection of duties on the goods, threatened to be tremendous.

In December, 1921, the government, in an effort to clear the warehouses and to relieve the merchants, granted permission for the reëxportation of the warehoused goods during a period of 120 days without payment of duties. Great efforts were made by American exporters and their agents to locate their goods and return them to the United States within that period. The value of the goods ran into the high millions of dollars. In spite of these strenuous efforts, it was found that imports to the estimated volume of $60,000,000 were still uncleared at the end of the period of grace, and the government extended the privilege several times, finally withdrawing it September 30, 1922.

The year 1922 opened amid very discouraging prospects. Sugar was still bringing only about 1½ cents per pound; there was a heavy carryover from the year before (1,160,000 tons on January 1), and the Sugar Finance Commission was about to go out of business. Although it had not been able to stop the steady decline in price, its abolition was expected to depress the sugar market still lower, with a short crop in prospect. In addition, the proposed rates of duty in the United States Fordney Tariff Bill gave no comfort to Cuban producers. However, the price of sugar did improve and by December it had reached 3.5 cents. Moreover, in spite of the United States Emergency Tariff rate, the surplus moved; the United States bought heavily and with a sugar shortage in Europe Cuba sold cane sugar there. Financial support increased, the threatened inability of a number of mills to continue grinding did not materialize, and profits were larger because of lowered costs of labor. In 1922, 5,097,000 tons of sugar were ex-

ported, of which 1,193,000 tons were old-crop sugar, about four-fifths of the total going to the United States. Other contributing factors in the partial economic recovery were the government measures aimed at reduction in expenditures and increases in revenues.

By 1923, the worst of the 1920–21 panic was over and imports and exports returned to the more normal figures of the years of the great war. In 1925, however, business again became depressed because of another drop in sugar prices, which averaged only 2.35 cents per pound as compared with 4 cents in 1924, with a crop yield about equal to the record crop of the previous year. The tobacco crop was considerably less than in 1924, but the sales of the holdover from the year before were larger and to the advantage of the growers. The value of imports was relatively stable, but a considerably less favorable trade-balance resulted because of the decided drop in the value of exports. After that time, both imports and exports steadily decreased, reaching the lowest figures in 1931 and 1933. The trade balance in 1930 was almost even, though still slightly in Cuba's favor. Beginning with 1934 there has been a pick-up in both imports and exports, but her foreign trade is still lower than in 1914.

## CUBAN ECONOMIC POLICY

Up to 1927, when new import duties became effective, Cuba's tariff had been mainly one for revenue, but with the introduction of that schedule, and with the imposition of various other taxes on business imposed about that time, she entered the ranks of definitely protective tariff countries. She was attempting to stimulate her local industries and to free herself to some extent of her dependence upon her one- or, at most, two-crop system. Since that time the tariff changes have been many and generally upward, and, in addition, changes in tariff classifications have often been made to the advantage of the public treasury.

In March, 1928, the president of Cuba formulated a government policy intended, among other things, to protect labor and make it possible for it to have the same standards of living enjoyed by labor in the most highly advanced countries; to control immigration, restricting it to the better grade of immigrants, shutting out undesirables, and attracting a better class; to aid agriculture by building better and more roads and sideroads, by establishing better banking facilities in the rural communities, by the encouragement of diversification of agriculture and the development of domes-

TABLE III

CUBA'S BALANCE OF TRADE 1914–1935

| *Year* | *Total Value of Imports* [1] | *Total Value of Exports* [1] | *Balance of Trade* [2] | *Year* | *Total Value of Imports* [1] | *Total Value of Exports* [1] | *Balance of Trade* [2] |
|---|---|---|---|---|---|---|---|
| 1914 | 118,202 | 173,344 | + 55,142 | 1925 | 297,324 | 353,984 | +56,660 |
| 1915 | 140,884 | 235,478 | + 94,594 | 1926 | 260,836 | 310,709 | +40,883 |
| 1916 | 215,962 | 320,720 | +104,758 | 1927 | 257,384 | 322,705 | +65,321 |
| 1917 | 256,085 | 355,852 | + 99,767 | 1928 | 212,817 | 278,070 | +65,253 |
| 1918 | 294,632 | 407,283 | +112,651 | 1929 | 216,215 | 272,440 | +56,225 |
| 1919 | 356,631 | 573,019 | +216,388 | 1930 | 162,452 | 167,411 | + 4,959 |
| 1920 | 557,017 | 794,009 | +236,992 | 1931 | 80,112 | 118,866 | +38,754 |
| 1921 | 354,403 | 278,061 | — 76,342 | 1932 | 51,024 | 80,672 | +29,648 |
| 1922 | 180,303 | 325,478 | +145,175 | 1933 [2] | 42,362 | 84,391 | +42,029 |
| 1923 | 268,850 | 421,075 | +152,225 | 1934 [2] | 73,388 | 107,746 | +34,358 |
| 1924 | 289,831 | 434,865 | +145,034 | 1935 [2] | 95,465 | 128,017 | +32,552 |
| | | | | 1936 | 103,215 | 154,785 | +51,570 |

[1] Thousands of Dollars. [2] Currency Dollars.

NOTE.—Value of imports and exports taken from Foreign Commerce Yearbook and Cuban trade statistics.

tic industries. The plan included improvement of the ports, of the system of taxation, and of banking; the establishment of a competent statistical service to serve the Government and all classes of Cuban industry; the negotiation of treaties to stimulate and facilitate trade; and a revision of the tariff. Just what could have been accomplished along all of these lines had the depression and various other factors not interfered cannot be assumed. Full benefits could not accrue from such treaties as have been negotiated with other countries, because of the general collapse of foreign trade.

FIGURE 3.—Providencia Sugar Mill, Guines, Habana, Cuba. (Courtesy of Office of the Commercial Attaché, Embassy of the United States, Habana, Cuba.)

In March, 1935, Cuba established a maximum column of import tariff rates at double the minimum rates, to apply to countries which purchased from Cuba less than one-fourth of the value of their exports to Cuba as shown in Cuban trade statistics, and an intermediate schedule, equal to an increase of one-fourth over the minimum rates, to apply to countries which purchase from Cuba over one-fourth but less than one-half of the value of their exports to Cuba,—raw materials and articles of prime necessity to Cuba to remain dutiable at minimum rates from whatever source.

This action was taken in an effort to compel a better balance of trade for Cuba with countries which exported so heavily to Cuba, but took little or none of Cuban products. A number of countries were penalized by the imposition of the maximum rates and a few by the intermediate rates. Several of those countries have shifted their trade currents sufficiently to be restored to the favor of the minimum rates and a few have moved up to the intermediate rates, but the system is still in effect wherever the balance of trade is sufficiently against Cuba.

A National Tariff Commission was created at the same time, to study tariff matters and to advise the government as to necessary modifications and regarding the provisions of the law.

### CUBAN IMPORT NECESSITIES

For the size of the island and the number of inhabitants, Cuba is a heavy purchaser of foreign goods, and as already mentioned, the United States sells more goods there than all other foreign countries combined.

For some time she has endeavored to supply some of her own demands for foods and for manufactured goods, and to that end has established a number of

manufacturing plants in addition to her sugar mills, cigar factories, distilleries, breweries, and tanneries. In this way she plans to lessen her dependence upon the variable income from the sugar and tobacco crops. There are now a number of establishments making boots and shoes, hats, clothing, cement, paints, paper, glass, pharmaceuticals, soap, fertilizers, confectionery, matches, furniture and other wooden wares, mosaics, tiles and bricks, ice, perfumery, cattle feed, thread, cord and ropes; salting and preserving meats, canning pineapples, tanning leather, and bottling mineral waters, etc. The canning, cord, and rope industries have progressed to the point of substantial production for export, most of which goes to the United States, and certain other developments are tending to reduce imports of certain products.

A great variety of foreign manufactured goods find their way to Cuba. Cotton manufactures are always a heavy item in her import trade. Imports of machinery and machines, and machine accessories, usually rank next in importance, although sometimes, especially in years of expanding industries and full operation of the sugar mills, this group exceeds in value any other class of merchandise. Imports of crude and refined mineral oils and gasoline, iron and steel manufactures, paper and paper manufactures, silk goods, vegetable oils, automobiles and automobile parts and accessories, rubber goods, leather manufactures (footwear is not now a big import item), sugar bags, glassware, manufactures of copper and copper alloys, fertilizers, and musical instruments, each in normal years run into millions of dollars, and even during the years of the recent financial slump are mostly in excess of one million dollars in value.

Among the food products which are always imported from abroad in large quantities are rice, wheat flour, meat, lard and its substitutes, beans, potatoes, and onions. Until recently corn, eggs, condensed milk, cheese and butter have also been largely imported, but the increased domestic supplies, in combination with the restricted buying power of the people in the last continued financial depression have brought the figures for these foods down to only small amounts. A number of other food and feed stuffs are imported, but none in such important quantities.

TABLE IV

VALUE OF CUBAN IMPORTS OF STAPLE FOODS

(Thousands of Dollars)

| *Food Product* | *1923* | *1926* | *1927* | *1928* | *1929* | *1930* | *1931* | *1932* | *1933* | *1934* |
|---|---|---|---|---|---|---|---|---|---|---|
| Lard and lard substitutes | 11,235 | 11,830 | 11,055 | 10,829 | 9,705 | 7,565 | 3,832 | 1,166 | 539 | 1,311 |
| Rice | 12,625 | 15,989 | 15,239 | 15,709 | 14,771 | 14,338 | 7,538 | 5,354 | 4,369 | 5,316 |
| Wheat flour | 8,515 | 9,599 | 9,425 | 8,200 | 8,596 | 6,474 | 3,846 | 3,085 | 3,099 | 4,188 |
| Meats | 12,491 | 12,870 | 12,367 | 9,648 | 8,866 | 6,604 | 2,452 | 916 | 528 | 910 |
| Milk, condensed | 4,639 | 11,830 | 11,035 | 10,829 | 9,205 | 3,689 | 1,508 | 731 | 251 | 144 |
| Beans, potatoes and onions | 14,031 | 13,606 | 13,013 | 8,589 | 10,186 | 7,488 | 2,743 | 1,777 | 1,844 | 2,502 |
| Cheese | 1,088 | 1,104 | 1,309 | 992 | 1,001 | 595 | 262 | 117 | 39 | 58 |
| Eggs (fresh) | 2,790 | 3,036 | 2,660 | 1,809 | 808 | 298 | 10 | ... | ... | ... |
| Corn | 3,099 | 2,370 | 2,441 | 1,348 | 998 | 229 | 35 | 39 | 138 | 2 |

NOTE.—The value of imports of food products for 1935 and 1936 is not yet available.

The United States does not have so large a share in supplying Cuba's table as she enjoys in the general run of manufactured goods such as textiles, metal manufactures, machinery, etc. Imports of lard substitutes, meats, and wheat flour, however, are principally of United States origin. Since bread grains, except corn, do not thrive in Cuba, wheat flour must always be imported. It remains rather steady in volume, though

the value fluctuates with price. Rice, steadily the largest single food item, is supplied by British India, Siam, the United Kingdom (transshipped) and French Indo China; condensed milk, by the Netherlands, Norway, the United States, and Denmark; beans, largely by Chile and Mexico; potatoes by the United States, Egypt and Spain; cheese by the Netherlands, Spain, and the United States; olive oil, largely by Spain; and other edible vegetable oils, mostly by the United States.

Fish—fresh, dried, salted, and canned—is also imported into Cuba, but comes largely from Canada and Norway. Some fresh and canned vegetables, and fresh and canned fruits are also imported; the United States has a share in imports of these foods.

## UNITED STATES DOMINANT IN CUBA'S FOREIGN TRADE

There are many reasons why the United States is Cuba's best customer and, on the other hand, has the greatest share in her import trade. Even prior to Cuban independence, the trade between the two countries was notably heavy and, since the 1902 Reciprocal Treaty between the two countries, the trade of each has benefited by exclusive reductions in the customs tariff of the other, thus giving these products the edge on imports from other countries. This lowering of the tariff between the

TABLE V

FOREIGN TRADE OF CUBA—IMPORTS FROM PRINCIPAL COUNTRIES

(Thousands of Dollars)

| *Country* | *1913* | *1921–22*[1] | *1922–23*[1] | *1926* | *1927* | *1928* | *1931* | *1932* | *1933* | *1934* | *1935* | *1936*[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 140,133 | 184,085 | 226,189 | 260,826 | 259,384 | 212,817 | 80,112 | 51,024 | 42,362 | 73,388 | 95,465 | 94,000 |
| From: | | | | | | | | | | | | |
| United States | 75,288 | 124,987 | 151,491 | 160,052 | 159,056 | 129,349 | 46,017 | 27,653 | 22,674 | 41,225 | 55,674 | 60,458 |
| United Kingdom | 16,066 | 9,631 | 10,986 | 12,474 | 11,697 | 10,428 | 3,985 | 2,985 | 2,429 | 3,941 | 4,105 | 4,797 |
| Spain | 10,033 | 7,739 | 10,453 | 11,516 | 10,619 | 9,383 | 4,183 | 2,979 | 2,613 | 4,051 | 4,819 | 3,312 |
| Germany | 9,674 | 3,478 | 5,339 | 7,743 | 7,762 | 6,586 | 3,023 | 2,134 | 1,898 | 2,905 | 4,428 | 4,341 |
| France | 7,332 | 5,281 | 7,835 | 11,873 | 12,460 | 9,624 | 2,851 | 1,688 | 1,215 | 1,456 | 2,437 | 2,440 |
| British India | .... | .... | .... | 16,506 | 15,684 | 16,067 | 6,918 | 4,546 | 4,056 | 4,580 | 5,145 | 2,362 |
| Per cent of Total: | | | | | | | | | | | | |
| United States | 53.7 | 67.9 | 67.0 | 61.4 | 61.8 | 60.8 | 57.4 | 54.2 | 53.5 | 56.2 | 58.3 | 64.5 |
| United Kingdom | 11.5 | 5.1 | 4.9 | 4.8 | 4.5 | 4.9 | 5.0 | 5.9 | 5.7 | 5.4 | 3.6 | 5.1 |
| Spain | 7.2 | 4.2 | 4.8 | 4.4 | 4.1 | 4.4 | 5.2 | 5.8 | 6.2 | 5.5 | 5.0 | 3.5 |
| Germany | 6.9 | 1.9 | 2.4 | 2.9 | 3.0 | 3.1 | 3.7 | 4.2 | 4.5 | 3.9 | 4.6 | 4.6 |
| France | 5.2 | 2.8 | 3.4 | 4.6 | 4.8 | 4.5 | 3.6 | 3.3 | 3.0 | 2.0 | 2.6 | 2.6 |
| British India | .... | .... | .... | 6.3 | 6.1 | 7.5 | 8.6 | 8.9 | 10.8 | 6.2 | 5.4 | 2.5 |

[1] Fiscal year. [2] First 11 months.

NOTE.—Japan's share of Cuba's imports in 1931 and 1932 was 1% of her total imports in 1931 and 1932, 2% in 1933, 4.3% in 1934, and 2.7% in 1935.

TABLE VI

EXPORTS OF CUBAN PRODUCTS—PRINCIPAL COUNTRIES

(Thousands of Dollars)

| *Country* | *1913* | *1921–22*[1] | *1922–23*[1] | *1926* | *1927* | *1928* | *1931* | *1932* | *1933* | *1934* | *1935* | *1936*[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 164,070 | 283,721 | 428,385 | 310,709 | 322,705 | 278,070 | 118,866 | 80,762 | 84,391 | 107,746 | 128,017 | 145,664 |
| To: | | | | | | | | | | | | |
| United States | 131,187 | 215,750 | 368,399 | 242,882 | 255,192 | 202,535 | 89,074 | 57,482 | 57,112 | 81,094 | 101,550 | 114,841 |
| United Kingdom | 18,421 | 39,464 | 37,841 | 21,981 | 32,001 | 45,326 | 12,444 | 16,326 | 16,326 | 14,498 | 13,979 | 19,329 |
| Germany | 4,648 | 618 | 407 | 1,676 | 2,271 | 2,785 | 1,531 | 675 | 675 | 793 | 2,275 | 2,088 |
| France | 1,676 | 9,427 | 3,375 | 5,975 | 4,284 | 4,792 | 2,004 | 2,040 | 3,398 | 3,155 | 2,243 | 2,266 |
| Canada | 2,786 | .... | .... | 4,584 | 4,652 | 3,797 | 898 | 600 | 531 | 521 | 255 | 215 |
| Netherlands | .... | .... | .... | 3,618 | 3,146 | 1,995 | 908 | 652 | 439 | 859 | 924 | 993 |
| Spain | 643 | 3,027 | 2,403 | 1,325 | 1,505 | 4,340 | 1,781 | 1,488 | 2,181 | 2,375 | 1,830 | 1,145 |
| Per cent of Total: | | | | | | | | | | | | |
| United States | 80.0 | 76.0 | 85.5 | 80.5 | 79.1 | 72.8 | 74.9 | 71.3 | 67.7 | 75.3 | 79.3 | 78.8 |
| United Kingdom | 11.2 | 13.9 | 8.8 | 7.3 | 9.9 | 16.3 | 13.9 | 15.4 | 19.3 | 13.5 | 10.9 | 13.2 |
| France | 1.0 | 3.3 | 0.8 | 2.0 | 1.3 | 1.7 | 1.7 | 2.5 | 4.0 | 2.9 | 1.8 | 1.5 |
| Spain | 0.4 | 1.1 | 0.5 | 0.4 | 0.5 | 1.6 | 1.5 | 1.8 | 2.6 | 2.2 | 1.4 | 0.78 |

[1] Fiscal year. [2] First 11 months.

two countries and the removal of other barriers to trade has been influential in stabilizing trade channels and stimulating commerce as the years have progressed.

Other features in building up this interdependent relation are the close economic ties between the two states, the quick means of communication, the nearness of the island and resulting ease of transportation of goods and persons from one country to the other. It is also better business for agricultural Cuba to grow foodstuffs and to produce other raw materials of prime necessity to industrial United States in exchange for which she can quickly supply her requirements in manufactured products at far cheaper prices than she can provide them for herself or buy them elsewhere since imports from the United States benefit by preferential reductions under the Cuban tariff. Furthermore, a great deal of capital from the United States is invested in Cuban sugar mills, mining operations, railways, etc., and is naturally predisposed to purchase its supplies from the United States.

A study of tables V and VI, showing the total amounts of Cuban exports and imports from the countries which, over a period of years, have led as users and suppliers in Cuba's foreign trade, will give a picture of the fluctuations in her trade with the different countries since 1913, and the annual percentage of her total trade which their shares represent.

The percentages of the total of her exports taken by the United States considerably exceeds the percentage of the total imports which originate in the United States, since she divides her purchases among several countries. At the same time a heavy unbalance of trade is shown each year in favor of the little Republic and against the United States, due, in part, to the amount of leaf tobacco

FIGURE 4.—A pineapple field, Cuba. (Courtesy of Office of the Commercial Attaché, Embassy of the United States, Habana, Cuba.)

taken by the United States for conversion into manufactured products, but mainly to her tremendous shipments of sugar to this country where the per capita consumption of sugar is so high. The United States as "best customer" takes from around 70 per cent to 85.5 per cent of Cuba's total exports, the United Kingdom ranking next with from around 7 per cent to a high of 19.3 per cent as her share. France and Spain are the only other nations with an average of as much as 1 per cent of Cuba's total exports to their credit on Cuba's balance sheet.

In spite of her tariff preference and shorter haul for goods, the United States has not been able to capture as large a share of Cuba's imports, although she has always averaged something over one-half of the total value of the goods entered for consumption in Cuba and for the first 11 months of 1936, she reached 64.5 of that total. The United Kingdom has generally ranked next to the United States as an old-time supplier of merchandise to Cuba, though frequently Spain, Germany, and France have been very close competitors, even exceeding her at times. Since 1926, up to 1936, British India has entered Cuban import trade, ranking next to the United States in exports to Cuba. Rice and sacks and

burlap for sugar bagging are an explanation of India's place in Cuba's import figures. It is interesting to note that the relative rank of the different countries as suppliers and consumers in Cuba's foreign trade has been remarkably maintained even during the 1931–33 depression.

An examination of the export and import figures and balance of trade through the period 1914–1935 shows that for every year since 1914, except the abnormal year 1921, when the sugar market collapsed with the resulting congestion, particularly in the port of Habana, the balance of trade has been preponderantly in Cuba's favor. Whenever exports were reduced, imports were also, more or less, correspondingly decreased. In 1921, however, the total value of exports dropped down to but little over one-third of the value for the previous year, while imports were maintained at above normal and higher in value than in any other year except in 1919 and 1920. At no time since has the total value of imports reached $300,000,000.

### EFFORTS TO STABILIZE SUGAR PRICES

By far the greater part of the cane produced in Cuba was originally grown on plantations owned by the planters who deliver their cane on contract to the sugar mills at the actual prevailing market price of sugar during the fortnight within which the cane is delivered to the mills or sugar centrals. The remainder of the cane not produced by the "colonos" is grown by the sugar mill companies, on land owned or leased by the corporations. The farmers are, therefore, mainly and directly interested in the price for sugar during the active grinding season and do not benefit by increases in the price in the months after that season has closed. They are credited on the company's books with the amount of cane delivered to the mills, since they are almost wholly financed by the mills and compensated at a definite ratio between the amount of cane delivered and the sugar content of the cane. The sugar from the "colonos" determines the purchasing power of the country, since the receipts from the sugar mills' share of the crop are largely owned by foreign capital and that income is not spent in Cuba, except for salaries, wages, and mill supplies. During the last decade the holdings of the sugar mills in sugar lands have greatly increased.

With the rapid expansion of Cuba's sugar industry, which was accompanied by the sacrifice of many of her fine forest resources, arose the problem of stabilizing the price which fell so suddenly a few years after the war when the production had mounted to about five times the yield of the period just after she won her independence. No one seemed to foresee that the sugar boom, which arose during the World War and continued for two years because of destruction of the European sugar industry by the war, could not last. With the collapse of that boom came bankruptcy for many of the Cuban sugar estates and they were absorbed by American capital. Besides, there was at that time a large surplus of sugar in Cuba which later came largely into the hands of the banks.

With the entry into effect of the United States 1922 tariff on sugar, by which Cuban sugar obtained a greater margin of protection against other foreign sugar, the price of sugar rose gradually to the benefit of both domestic and Cuban producers; and again in 1924–25, production increased by 1,700,000 tons. For over ten years there has been a continuing low price for sugar, for along with the domestic industry in the United States proper the production of sugar in Puerto Rico, Hawaii, and the Philippines was also stimulated under the protection of the rates of the United States

import duty. Furthermore, other sugar producing countries have stimulated the production of sugar by cartel agreements and by sugar subsidies and bounties, all contributing to world overproduction.

In order to reduce this unprofitable overproduction, efforts have been made to restrict the world output. First, Cuba attempted to alleviate the situation by reducing her own crop which at that time amounted to about one-fifth of the world production. The 1924–25 crop was the last one grown under unrestricted production. In that year Cuba's yield mounted to 5,189,000 tons.

In the fall of 1925, the sugar centrals were prohibited from grinding any of the 1925–26 crop of cane before January, and the crops for the next two years were restricted to 4,500,000 and 4,000,000 long tons respectively. These limits were in fact exceeded by comparatively small amounts both years. The results of these efforts were disappointing, for although there was a rise in the price (average 2.78 cents per pound), the receipts from the crop were not sufficient to compensate for the loss by the volume sacrificed. The Tarafa Sugar Law replaced the previous legislation in 1927, and provided for a Sugar Export Corporation to dispose of the surplus sugar, after the domestic needs and the requirements of the United States were supplied, in the way deemed most advantageous to the producers. The corporation was financed by a 1 cent per bag tax on all sugar produced. Under the new regulations, production for the 1927–28 campaign was restricted to 4,000,000 tons, with a carryover of 250,000 tons. Three million, three hundred thousand tons were allotted for sale in the United States, and the company was expected to dispose of 600,000 tons in markets outside of the United States.

During the 1928–29 season, the only restriction on sugar was the provision that the mills should not begin grinding until January 1, 1929, and the total yield for that crop was 5,156,000 long tons.

FIGURE 5.—Coffee in the Candelaria Hills, Pinar del Rio Province, Cuba. (Courtesy of Bureau of Foreign and Domestic Commerce.)

Although the restriction had been withdrawn for the 1928–29 campaign, the idea had not been abandoned, and a plan for coöperation by all of the large sugar producing countries was evolved.

The first conference, held in the Netherlands between the Cuban representative, Colonel Tarafa, and those of the other sugar areas, failed because of the refusal of the Java delegate to cooperate. This was followed the next year (1929) by a conference held in Brussels, and a three-year restriction on sugar production was proposed, but no agreement could be reached.

In the meantime, in July, 1929, a new agency had been established in Cuba, known as the "Agencia Coöperative de Exportacion," which was to be a "sole seller," and was to exercise exclusive control over Cuban production of sugar for export, beginning with the 1929–31 campaign, and to sell the carryover from the 1928–29 crop. The plan was that the agency should sell the output of the mills on an entirely coöperative basis, each mill to obtain for its sugar the average price of the total crop. The producers were directed to turn over their sugars to the agency from which they received certificates of identification against warehouse receipts. Raw sugars were sold by the agency to refiners in the United States to be refined and reëxported after verification and under bond and guarantee by the refiners. The agency failed to fulfill its functions and the plan of holding the sugar off the world market for a better price, independently of other nations, was abandoned.

In 1930, a group of citizens of the United States and Cuba, under the chairmanship of Mr. Thomas L. Chadbourne of New York City, was appointed to confer with representatives of the sugar producing countries. Conferences were held in Amsterdam, Brussels, and Berlin. Early in 1931, seven of the sugar countries, totaling about 45 per cent of the world production, agreed to crop restriction for a period of five years. Those countries were Cuba, Java, Germany, Czechoslovakia, Poland, Belgium and Hungary, and Peru and Yugoslavia joined later.

As a result, the "Chadbourne Plan" of production and export restrictions was concluded at Brussels May 9, 1931. It was agreed upon as a means of protection and promotion of the sugar industry by limitation of exports for a five-year period. One and one-half million long tons of Cuban sugar were segregated and withheld from exportation to be systematically marketed, 300,000 tons during each of the five years, 1931–1935, and 100,000 tons were withheld and marketed in the same way in Java during the same period. Exports were also restricted in each of the seven agreeing countries; 2,200,000 tons per year in Java (other than segregated sugar), 570,815 tons in Czechoslovakia, and proportional restrictions in the other countries. For Cuba the amounts were set at 3,305,000 tons in 1931; 3,455,000 tons in 1932; and 3,505,000 tons in 1933, in 1934, and in 1935.

While awaiting official action upon the Chadbourne Plan, Cuba had prohibited the exportation of sugar until November 15, 1930, in order to segregate the necessary amount of sugar to be withheld from exportation, and a decree of January 31, 1931, limited Cuban production for the 1930–31 season to 3,122,000 long tons, and exports to the United States to 2,800,000 tons of which 2,577,000 were to be supplied from the 1930–31 crop. Two hundred twenty-three thousand tons from the carryover from the previous crop were shipped to the United States during January, 1931. Shipments to other markets were also limited to 395,000 long tons from the

current crop and one-fifth of the segregated sugar was to be disposed of by the National Sugar Export Corporation.

The Cuban Sugar Stabilization Institute, composed of five sugar mill owners and two planters, was established on May 6, 1931, to represent "all present producers of sugar in Cuba or who may be established during 1931–35 inclusive," to take part in conferences, to institute and carry on negotiations with sugar producers in other sugar producing countries.

In May, 1934, the United States established quotas on imports of sugar. The quota for Cuban sugar in 1934 was fixed at 1,902,000 short tons, raw value. This action, together with two reductions in the United States duty on sugar, first the reduction by presidential decree from 2 cents to 1.5 cents per pound, followed by the reduction to 0.9 cents per pound on Cuban sugar provided by the reciprocal trade agreement between the two nations, was of assistance to the Cuban sugar industry.

On January 1, 1935, sugar stocks in Cuba stood at 706,621 long tons as compared with 1,048,028 at the beginning of the year before. Production was restricted to 2,315,459 long tons, but the actual yield was 2,274,303 tons. The total amount of raw and refined sugar exports from Cuba during 1934 was 2,457,530 long tons; in 1933, 2,407,618 tons, and in 1932, 2,608,470 tons; exports to the United States totaled 1,557,765, 1,396,119, and 1,701,618 long tons, during the same years. The Chadbourne Plan expired on September 1, 1935, but an unofficial agreement regarding the marketing of sugar was maintained, with Cuban control exercised by the National Sugar Export Corporation. The 1935 output of sugar totaled 2,537,385 long tons, an increase over the yield for 1934. Raw and refined sugar was exported to the amount of 2,487,602 long tons, also a small increase over 1934 exports, with 1,556,620 tons going to the United States, a small decrease from the amount taken by the United States in 1934. The 1935 United States quota for Cuban sugar was first fixed at 1,857,022 short tons, but was later reduced to 1,822,596 short tons. By September the full quota had been shipped to the United States. The amount permitted for export to other countries was fixed at 708,451 long tons, and 150,000 long tons were reserved for domestic consumption.

For 1936, the Cuban production of sugar was officially limited to 2,515,000 long tons, and the quota for the United States to 1,852,575 long tons. The 1935–36 actual production was 2,554,000 long tons.

The United States quota of Cuban sugar for 1937 has been fixed at 1,922,423 short tons, compared with the final 1936 quota of 2,085,022 at the close of the year and production for 1937 has been set at 2,939,000 long tons.

FIGURE 6.—Coffee tree in bloom, Cuba. (Courtesy of Bureau of Foreign and Domestic Commerce.)

In January, 1936, the Cuban government was given regulatory power controlling the production and exportation of sugar and the establishment of production quotas among the individual sugar producers of the country during a six-year period from January 1, 1936, to December 31, 1941. The quantity of production, the distribution, and the exportation of sugar is determined in accordance with international agreements; upon recommendation of the Cuban Institute for the Stabilization of Sugar; or at the request of the National Association of Planters to be made prior to November 1 preceding the year for which the regulation is sought, provided this request is supported by members representing more than 65 per cent of the sugar mills and of the sugar production of the previous crop in Cuba. Two million, three hundred fifteen thousand long tons are used as the provisional basis for determining individual production quotas, and the quota for each mill (except the "free mills" whose quotas are variously provided for) is established on the basis of its largest production as recorded by the Secretary of Agriculture of Cuba. The Cuban Institute for the Stabilization of Sugar was reorganized to take over the functions of the National Sugar Export Corporation.

It has not been possible to cover in an article of this length all of the different laws and orders and the changes in the operations of the restrictions on sugar during the last several years, but this attempts to give the outstanding efforts by Cuba to bolster its sugar industry.

## TARIFF RECIPROCITY WITH THE UNITED STATES

Even before the independence of Cuba, special concessions were granted to certain imports of American goods for a period of short duration in return for duty-free entry of Cuban sugar, molasses, coffee, and hides into the United States. Under the 1891 commercial agreement with Spain, goods on a "transitory" list of products imported into Cuba from the United States were granted concessions in duty from September 1, 1891, to July 1, 1892. A schedule of seventy-five items with duty-free entry or reductions in duty from 25 to 50 per cent of the maximum tariff then became effective on imports from the United States. These concessions were withdrawn by royal decree of August 27, 1894. In February, 1895, however, United States products were granted entry under the minimum tariff to continue as long as the lowest rates of the United States tariff applied to Cuban goods.

After Cuban independence, the Permanent Treaty between the United States and Cuba, based upon what is known as the Platt Amendment which was also embodied in the Cuban constitution of 1901, together with the Reciprocity Treaty of 1902, governed relations between the United States and Cuba, the one the political relations, and the other the commercial dealings between them. These agreements remained in operation until the Treaty of Relations signed by the United States and Cuba on May 29, 1934 cancelled the Platt Amendment from date of its effectiveness on June 9, 1934, and the new Reciprocal Trade Agreement entered into effect on September 3, 1934. Since this study is concerned primarily with commercial matters, only the reciprocal trade agreements will be discussed except to note that the Platt Amendment gave the United States the right to intervene in Cuban affairs in case of aggression by a foreign country or to protect life and property on the island if threatened by domestic upheaval. With reasonable assurance of security, American and other foreign capital was encour-

aged more and more to enter Cuba for development of her remarkable resources. This, seconded by the fruitful and protected market of her nearby neighbor, stimulated her exports and greatly increased her buying power. On the other hand, the benefit of reduced duties applicable exclusively to imports from the United States, gave exporters of American goods an advantage over exporters in other countries which cultivated the Cuban market. Thus, the United States, a great user of such products, became Cuba's chief customer, and at the same time was able, because of these tariff preferences combined with other causes, to win the greater part of her import trade as is shown by Table VI.

The preamble to the reciprocity treaty between the United States and Cuba, concluded December 11, 1902, and effective from December 27, 1903, to September 3, 1934, states that the purpose of the treaty was a desire to strengthen the bonds of friendship between the two countries and to facilitate their commercial intercourse by improving the conditions of trade between them. That treaty bound reciprocally duty-free entry of the products then on the free list of each country. Other goods exported from Cuba to the United States were guaranteed a reduction of one-fifth of the duties effective at time of entry into the United States.

On dutiable products from the United States into Cuba, reductions were granted varying with the article as follows: Twenty per cent on articles not mentioned in the treaty (covering about one-half of her imports of United States goods); 25 per cent, mostly on machinery and apparatus of copper or copper alloys, or in which copper predominates; iron and steel manufactures; glass and crystal wares, except window glass; certain pottery wares; and certain fishing products; 30 per cent on a long list of goods, including such important items as butter; wheat flour; corn and corn meal; drugs; pharmaceuticals and chemicals; colors and dyes; window glass; made-up articles of linen, hemp, and similar fibers; cotton and cotton manufactures, except knit goods; cutlery; footwear; musical instruments; gold and silver plated wares; most paper goods; soaps, except fine toilet soaps; and preserved

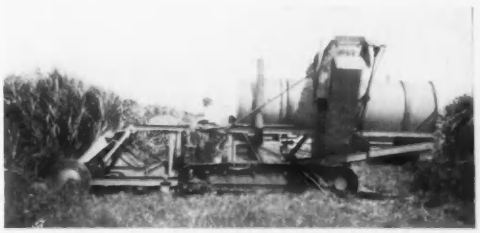


FIGURE 7.—Cane harvester beginning operations, sugar plantation, Cuba. (Courtesy of Bureau of Foreign and Domestic Commerce.)

vegetables; and 40 per cent on other specified products, including knitted cotton manufactures; cheese; preserved fruits; rice; cattle; wood pulp; perfumery; porcelain; fine soaps; umbrellas and parasols; silk and wool and manufactures of silk or of wool; watches; glucose; and dextrine.

Among the many articles falling under the 20 per cent reduction were lard, a heavy item in United States trade with Cuba; oleomargarine; meats and poultry; condensed milk; machines, except those largely of copper; locomotives; motors; stone and stone wares; petroleum and its products; articles of fire clay; glazed and similar paving bricks; unglazed building tiles; gold and silver wares and jewelry (but not watches); copper and copper wares, except machinery; other metals and metal manufactures, except iron and steel; vegetable oils; starch; explosives; fertilizer; and wooden wares, including furniture.

Tobacco in all forms was the sole commodity reserved by Cuba upon which no

concession by way of reduced duty or rebate should be accorded to the United States, and the United States specified that no Cuban sugar should be admitted into the United States at a reduction in duty greater than 20 per cent of the rates of the tariff then in effect, and guaranteed that the rates of that tariff (1897) should not be reduced on sugar from any other country.

In recognition of the close economic and other relations between the two nations, these concessions were not applicable to the products of other nations, but did apply to any concession made *to* any other nation. They remained the controlling factor in trade between the two countries up to the time the reciprocal trade agreement of August 24, 1934 became effective.

After several years of collapse in the sugar market, followed by the general world wide depression from 1929 and the continued low purchasing power everywhere, trade between Cuba and the United States was reduced tremendously. It was believed that a new reciprocal trade agreement might serve to boost trade between the two countries. With that in view, intensive studies of the trade were made by officials in both countries, resulting in the new reciprocal trade agreement, concluded August 24, 1934, to be effective on September 3, 1934, and to remain effective for three years and thereafter until denounced by one of the countries upon six months notice. This agreement accords exclusive and preferential treatment to many commodities of each country imported into the other and, as already mentioned, supercedes the earlier reciprocity treaty.

Cuba, in return for valuable concessions on its sugar, rum, tobacco, and off-season fruits and vegetables (which comprise well over 90 per cent of the island's exports to the United States) granted the United States increased tariff advantages on most of those commodities which have been of outstanding interest to our exporters to that market. Chief among these are such American agricultural products as lard, salted and smoked meats, vegetable oils, wheat flour, rice, potatoes and onions, feedstuffs, and lumber, which, upon their importation into Cuba, receive substantial advantages in the form of increased preferences and (or) reduced customs duties. On manufactured products, Cuba's reductions in duties apply to a wide range of articles, including iron and steel products, hardware, textiles (especially rayon goods), automobiles (including accessories and tires), machinery in general, paper and cardboard, paints and varnishes, tennis shoes, incandescent lamps and electrical equipment in general, and on many other products.

TABLE VII

CUBAN SUGAR STATISTICS,[1] 1922–1936

| *Year* | *Number of Mills Operating* | *Production Long Tons* | *Per Cent of Total Waste Production* | *Price (Annual Average) Cents per Pound* | *Total Exports Long Tons* |
|---|---|---|---|---|---|
| 1922–26 (Average) | 182 | 4,383,000 | 20.7 | 3.23 | 4,334,000 |
| 1927 | 177 | 4,509,000 | 18.7 | 2.67 | 4,147,000 |
| 1928 | 172 | 4,042,000 | 15.4 | 2.20 | 2,707,000 |
| 1929 | 163 | 5,156,000 | 18.7 | 1.73 | 4,586,000 |
| 1930 | 157 | 4,671,000 | 17.1 | 1.25 | 3,213,000 |
| 1931 | 140 | 3,121,000 | 10.8 | 1.13 | 2,723,000 |
| 1932 | 133 | 2,604,000 | 10.0 | 0.72 | 2,608,000 |
| 1933 | 125 | 1,995,000 | 8.3 | 0.97 | 2,408,000 |
| 1934 | 135 | 2,274,000 | 8.9 | 1.20 | 2,458,000 |
| 1935 | 132 | 2,537,000 | 9.8 | 1.58 | 2,488,000 |
| 1936 | 147 [2] | 2,554,000 [2] | .... | .... | 2,487,338[2,3] |

[1] World Economic Review, 1935 (Bureau of Foreign and Domestic Commerce).
[2] Reported by Commercial Attaché, United States Embassy, Habana.
[3] Up to Dec. 15.

Under the terms of the agreement, both countries have agreed that the percentages of preference granted each other are minimum, and that they shall apply to the lowest rate of duty granted by either country to like products imported from any third country, that is, if a duty is reduced on other foreign goods, imports from the United States will receive proportional reductions below those rates. They also agree that certain specified rates of duty shall not be increased. Products of either country which were entitled to duty-free entry in the other on the day the agreement was signed continue free of customs duties.

There are a number of other phases of trade between the two countries which were adjusted and regulated to the mutual advantage of Cuban and American farmers, manufacturers, and merchants, too detailed to be covered here.

## QUICKENING OF TRADE UNDER NEW AGREEMENT

In spite of the general slow recovery in trade in the last half of 1934 and the first half of 1935, there was noted a definite general upward trend in the exchange of goods between the United States and Cuba during the first year following the effectiveness of the 1934 reciprocal trade agreement. Even considering the whole of the 1934 calendar year, total imports from the United States had increased $28,551,000 and exports, $23,982,000 over the values for 1933. Ambassador Caffery reported to the State Department that the increased business between the United States and Cuba from the date of effectiveness through the middle of July, 1935, had been estimated by the American Chamber of Commerce of Cuba through a canvass of its members to approximate for imports of machinery and machine supplies, from 14.17 up to 100 per cent; electrical machinery, household appliances were from 45 up to 85 per cent higher; agricultural machinery and implements, 558 per cent; steel products, 47 per cent; automobiles, about 94 per cent; footstuffs (lard, other fats, canned foods, pickled pork, flour, etc.) from 120 to 300 per cent; cement, 400 per cent; photographic cameras and supplies, 53 per cent; petroleum products, 37.38 per cent; repair and construction materials, 348 per cent; pharmaceuticals from 10 to 30 per cent; shoe machine supplies, 86 per cent; smokers' supplies, 800 per cent; and sewing machines, about 250 per cent.

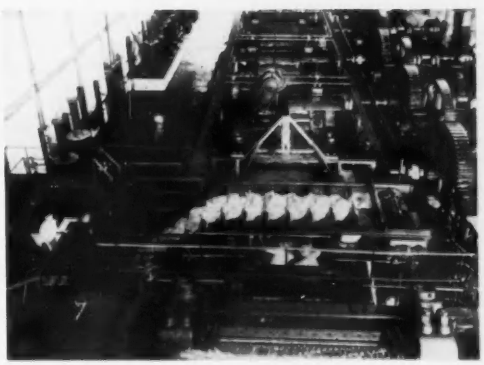


FIGURE 8.—Interior of Cuban sugar mill. Sugar cane hay after it is discharged from the disintegrator. (Courtesy of Bureau of Foreign and Domestic Commerce.)

At the beginning of the present year, 1937, the State Department announced that the "striking two-year revival in Cuban-American trade which characterized the first year" of the life of the new agreement, as compared with the preceding two years, had continued through its second year ending August, 1936. Exports to Cuba increased over the reported gains for the first 12 months of its operation. The State Department announced that during the second full year of the operation of the trade agreement, the value of the United States products sold to Cuba aggregated $64,000,000, as compared with $55,000,000 during the first year, and that the rate

FIGURE 9.—Street scene, Jaronu sugar mill, Jaronu, Camaguey, Cuba. (Courtesy of Office of the Commercial Attaché, Embassy of the United States, Habana, Cuba.)

of export increase over the preceding two years was 85 per cent for the first agreement year and 113 per cent for the second.

The value of Cuba's exports to the United States reached $151,000,000 during the first twelve months under the agreement, after the low average of $51,000,000 for the two preceding years. This large increase for the twelve-month period following the conclusion of the agreement was due primarily to the fact that sugar shipments to the United States and withdrawals of sugar from bonded warehouses, which would normally have been made during the early part of 1934, had been withheld in anticipation of the reductions in the rates of duty on sugar, which became effective on June 8 and September 3, 1934. Four-fifths of the Cuban sugar quota for the calendar year 1934 was filled during the four months following the conclusion of the agreement, from September to December, 1934. The entire 1935 quota was filled during the first eight months of 1935. As a result, the import figure for the twelve months following the conclusion of the agreement includes four-fifths of the 1934 calendar year quota and all of the 1935 quota.

It is interesting to note that the stimulation to trade was not limited merely to the products on which duties had been reduced or bound, but that exports of American products generally were shipped to Cuba in greater quantities. Goods on which Cuban duties were reduced accounted for $15,000,000 of the increase, those on which duties were bound, for $6,000,000 ($21,000,000 together) and other products for the remainder of the $21,000,000 increase in United States exports to Cuba. Gains were widely scattered, benefiting agriculturists and manufacturers, and shippers generally. The food products making most notable gains are lard and pork, milled rice, wheat flour entirely of United States production, white potatoes, onions, certain canned fruit and vegetables, certain oils and fats, and canned sardines.

Outstanding among the manufactured products reporting increased trade during this second year are automotive products; radio apparatus; electric refrigerators; sugar mill machinery; sewing machines; typewriters; structural steel; pipes and fittings; wire and other metal products; certain textile yarns, fabrics, and manufactures; upper and patent leather; paper boards and writing paper; glass containers; ready-mixed paints; certain non-proprietary druggists' preparations; cigarettes; and toys.

The products on which the existing Cuban duty or duty-free treatment was bound against change, for which gains were most marked during this second year, are flour, not wholly of American wheat; southern pine lumber; bituminous coal; petroleum products; raw cotton; certain fresh fruits; boots and shoes; special types of leather; certain textile products, including cotton and rayon fabrics and cotton bags; various types of paper; and proprietary medicines. While most of the important exports to Cuba showed increases, exports of certain particular items, including certain vegetable oils, certain textiles, and certain petroleum products, declined.

Cuba's exports to the United States are largely agricultural and either supplement the domestic supply grown in the United States or are distinctly localized products. The products granted reduced duties by the United States under the new trade agreement account for $61,000,000 out of the total second-year increase of $67,000,000, with sugar absorbing $57,000,000 as its share of the increase. Tobacco leaf and cigars, rum, out-of-season vegetables (tomatoes, eggplant, lima beans, peppers, okra, white potatoes, cucumbers), certain subtropical fruits and their products, crude glycerine, and cabinet wood showed smaller increases.

Other changes, up and down, were apparently controlled by other special influences affecting imports and exports of the particular commodities, whatever their character.

# POOTU, A LOST ISLAND

*Liu En-lan*

THE island of Pootu, like the other Chu-Shan islands, is part of the Tinghai County of Che-Kiang province, separated from the mainland by the sea of Chi-tou. The surface is rugged and mountainous, with ten notable peaks, not one of which rises to a thousand feet in height. The island is situated about forty miles east of the Che-Kiang coast. It is four miles long from north to south, and from one to two miles in width, about four square miles in area.

The island was inhabited before the days of the Tang dynasty. In the days of the first emperor of Tang, Buddhism was introduced. Many temples were then erected, and later enlarged during the succeeding dynasties. Today it has seventy large temples and 192 small temples and shrines. In recent years, however, the temples have been deteriorating, and parts of the temple buildings are used as hostels for people who go there for the summer.

In July and August, there are two direct sailings per week between Shanghai and Pootu, but for the rest of the year there are only two indirect ways of going, one by train from Shanghai to Ningpo, and the other by a steamship from Shanghai to Ningpo. Boats leave Ningpo every morning for Pootu. They make three stops on the way: Chenhai, Tinghai, and Shenchiamen (Figure 1).

Between Ningpo and Chenhai, the Yungkiang is bordered on both sides by hundreds of ice-houses (Figure 2). Farmers gather ice from fresh water ponds during the winter months and store it up in straw roofed huts thickly covered over by vines. The ice is sold to fishermen in Tinghai for fish storage during the summer season. Each ice-house is worth about five hundred dollars on an average.

Between Chenhai and Tinghai are many islands which rise sharply out of the water and give the effect of recent

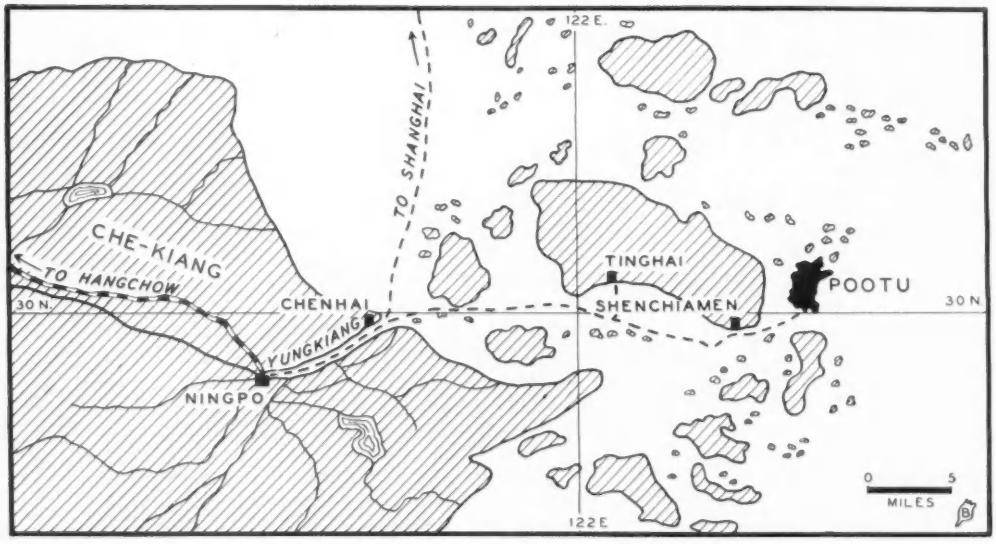



FIGURE 1.—Pootu and its environs, showing the chief route to the island.

FIGURE 2.—The Yungkiang is bordered on both sides with hundreds of ice-houses.

submergence. Hundreds of fishing boats occupy the near-shore waters and the dock of Tinghai is crowded with baskets of fish.

From Tinghai to Shenchiamen the islands are almost all joined by sand bars, and some of the large islands have stretches of alluvial plain along the east and west coasts, signs of recent emergence. The flats serve as salt factories. They are dotted with mounds of earth which are used for salt evaporation. The salt thus made by crude methods is used by the fishermen and fish merchants.

North from Shenchiamen for about three-quarters of an hour, the boats anchor about twenty yards from the shore of Pootu, at the foot of the famous sacred Pootu mountain. Squads of Sampans meet the steamers, and if only the traveller knows to which temple he wishes to go, he can get into the Sampan for that temple and servants from the temple take care of his luggage!

## POPULATION OF POOTU

The island is divided into Front Mountain and Back Mountain by a deep valley. The dock is at the south extreme of the Front Mountain. The Front Mountain has a longer human history than the Back Mountain, and therefore it is more populated. According to legend, a Buddha jumped across the ocean and landed at the southeast corner of the Front Mountain. One footprint in a granite rock is still preserved as one of the most sacred and noted places on the island. It was the starting point of Buddhism on the island.

The largest group of the island's folk are the monks who make up over one-half of the total population; the next largest is that of laymen, and the smallest group is that of women. A census taken in September, 1935, reveals that there are 679 monks and 116 families on Front Mountain, and 568 monks and 113 families on Back Mountain. Figure 3 shows the total population of monks, men, and women in percentages. Though Front Mountain has three families more than Back Mountain, yet Back Mountain has more women folk than Front Mountain, because the families of Front Mountain are congregated as a small business center with seasonal occupancy. They own small shops selling rice, vegetables, souvenirs, shoes, and tea. Their business is seasonal and therefore most of the population is migratory. They go back to Tinghai or to the mainland for the winter season, and therefore in most cases do not bring their families with them for the summer. The families living on Back Mountain are scattered farmers, who cultivate the land for the monks. Because they are sedentary they have their women folk with them. They cultivate the valley bottoms and the terrace slopes of weathered rock. Their chief crop in the valleys is rice, and on terraced land, sweet

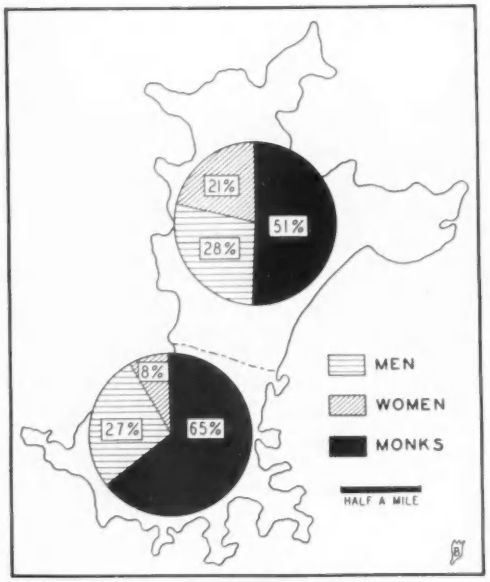



FIGURE 3.—The population of Pootu is more than 50% monks who make no contribution to the welfare or progress of the island.

potatoes. There are few other crops, or even vegetables.

TABLE I

| | Front Mountain | Back Mountain | Whole Island |
|---|---|---|---|
| Monks | 679 | 568 | 1,247 |
| Men | 286 | 317 | 603 |
| Women | 76 | 229 | 305 |
| Total | 1,041 | 1,114 | 2,155 |

## THE LAND

The surface geology of the island is shown in Figure 4. The island is of volcanic origin. No sedimentary rock has been discovered by which to date the eruptions. Through long years of erosion by the changing weather and the stormy waves, it is now simply a group of peaks joined together by long ridges, and alluvial fans, plains, and tombolos.

The peaks are sharp granite needles, monuments of fantastic form, in many places so steep that no soil can accumulate. In other places there is only a thin film of weathered waste for the growth of grass. Near the coast and in the valleys among the mountains of Pootu are lowlands, all very small. The two larger plains which are occupied by the Front and Back temples respectively are shown in Figure 5. Many temples are scattered about on slopes and mountain tops. Since the valley bottoms are small and limited, the farms are very tiny. Even though the farmers tend their crops with the greatest care, they still cannot possibly produce enough to feed the island's tiny population. Therefore, most of the food, even the vegetables, must be imported from other islands and the mainland.

Travelling through the island of Pootu one notices that the farmers keep no pigs, and practically no chickens; the population of the island is mostly of a religious group that does not eat meat and will kill no living things. All are strict vegetarians. No meat of any sort can be bought on the whole island. Even eggs cannot be bought. No meat products of any kind are allowed to land on the dock. Merchants who smuggle in eggs, meat, or even fish, if discovered, are heavily fined. The only common domestic animals that can be seen on the

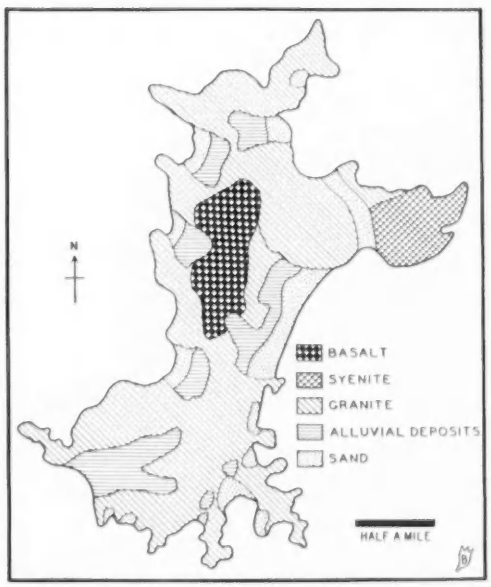



FIGURE 4.—The areal geology of Pootu, the factor which plays a most significant part in determining the economy of the island.

island are yellow cows, dogs, and cats. Fortunately vacationists and pleasure seekers may bring in canned meats.

The coast of Pootu has many headlands, bays, tombolos, bay head beaches, and side beaches. In places it has bold and steep cliffs. It looks as if the coast were at a mature stage of submergence. On the hilltop at the extreme southwest corner of the island is a huge balanced rock. The hill is about 25 meters high and the rock is about 12 feet in length and 7 feet in thickness and 5 feet in width. The rock is perched on a huge piece of granite outcrop on the very top of the hill. It has obviously been placed there by natural forces and not by human strength, indicating that once the hill must have been submerged below the water level. Along the coasts are several deep narrow gaps extending far inland. People on the island call these gaps caves, but they are really joints enlarged by corrosion. The coast resembles the coast of Maine in the United States near Mt. Desert Island.

Off the east coast, fishermen often gather corals from the sea bottom, which they sell on the island as curios, and on the beach broken pieces of decayed coral are cast up by the ocean waves from time to time, indicating that the island once must have been surrounded by a warm shallow sea.

FIGURE 6.—Terraced land on the west coast of Pootu.

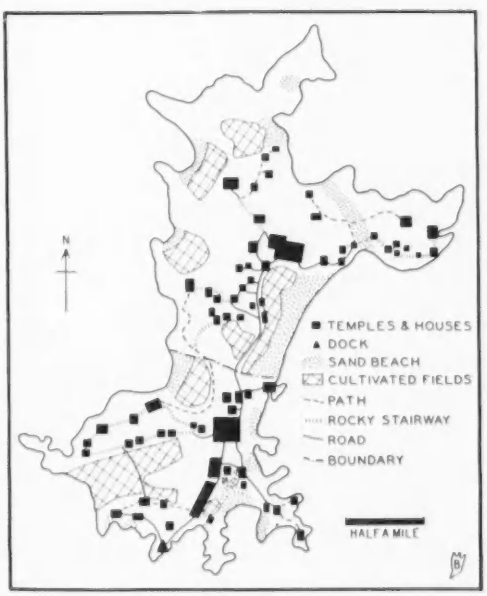



FIGURE 5.—Land utilization of Pootu, the distribution of temples and houses, and the beaches.

One legendary story concerning the first introduction of Buddhism to the island states that in the days of the Tang, a Japanese monk, Hwei-O, was returning with the sacred picture of Buddha from the sacred mountain, Wu Tai, by way of the South Sea. His boat was caught in a coral reef and he could go no further. He then thought maybe it was the will of Buddha not to go to Japan, so he stayed at Pootu. The coral seems to bear out the theory that in the past the island must have been surrounded by a warm narrow sea with an abundance of coral reef.

Moreover, the lowland plain back of the "Thousand Foot Beach" on the east coast is only thinly covered by colluvial and alluvial deposits. In many places bedrock remains exposed. In other places it is only about one to two feet below the mantle of unconsolidated materials. The plain is no doubt a wave-cut terrace of past days.

Summing up the above stated facts, the story of the geological history of Pootu seems to be this: at present it is in the mature stage of submergence, but

FIGURE 7.—Back Temple and some cultivated fields on the east coast of Pootu.

it must have been emerging about Tertiary time; and preceding the stage of emergence, there was another period of submergence.

## THE CLIMATE

The climate is moderated by marine contiguity. Summer is cooler and winter warmer than the interior of the mainland in the same latitude. Spring usually lasts into the last part of June or even the first part of July. In summer it is dominated by the southeast monsoon and in winter by the northwest trade and the winter monsoon.

The rainfall, as a rule, is less than that of the mainland. This is due to several reasons: (1) the island as a whole is of low relief, so there is not much uplift of the onshore winds to give much orographic rain; (2) the trends of the coast line are in most part parallel to the prevailing winds; (3) in the summer season because of low marine temperatures there is very little convectional or thunderstorm rain. Though the annual rainfall is not very great, yet the sea breezes from the oceans bring moisture-bearing clouds to the island in the form of heavy fog, so that the relative humidity is always high, and the air is always very damp.

FIGURE 8.—The coast of Pootu has many headlands, bays, tombolos, bay head beaches, and side beaches.

FIGURE 9.—A large area of the southeast corner of Pootu is covered with sand.

Winds are brisk to strong. A large area of the southeast corner is covered by sand, as is a long stretch of land along the east coast. Rice fields are irrigated by runoff from the mountains. There are only a few infant streams. Water for domestic supply is brought from springs in the higher valleys through bamboo pipes. There are not many wells, and they are merely reservoirs. Only one well is drilled to underground

water accumulated in a crack or a joint of the granite bedrock.

The monument-like peaks, the trees, the crooked shady paths, the temples together give the island a mosaic picture of rare beauty. In addition there are places of legendary importance and long stretches of beaches to occupy the time with pleasant pastimes. One cannot help feeling that the island is not yet developed or used to its best advantage.

Over half of the island's population is

FIGURE 10.—The lowland back of the "Thousand Feet Beach" on the east coast is only thinly covered with colluvial and alluvial deposits.

human waste. The monks are merely consumers with no productive power. They get up by midnight and chant for hours in the temples, but neither the world nor any of the inhabitants of this world is profited by their ceaseless chanting. They no longer exist for the world because they are making no contributions,—they virtually are buried alive.

As far as agriculture is concerned the island is also a waste. The taboo on productive domestic animals has reduced the efficiency and productiveness of the farming population, as well as its possibility for economic profit.

Though the arable land is small in proportion to the total area, the soil is of good structure. Not all the arable land is cultivated, because of the question of ownership. When a piece of land is left by an older monk to a few younger monks, they are unable to agree to any policy of use and prefer to leave the land to weeds and grass rather than to quarrel over whatever may be raised on it. As a result a large proportion of the arable land is not cultivated.

For the portion of land that is cultivated, the farmers are following the policies of their ancestors in crop varieties, combinations, and distribution. Tea is grown on only one hilltop, for it has not been introduced to the other hills. The island is devoid of bamboo groves. The sandy fields lie idle instead of yielding peanuts. Both the climate and the soil are good for fruit such as peaches, apricots, and pears, but no one grows them. Most of the hilltops are badly in need of reforestation.

As far as trade is concerned the island is also a waste. It is situated in the midst of a fishing ground, but no fishing is done on the island and there is no selling and buying of fish. There are

FIGURE 11.—Crossing a tombolo on the Island.

plenty of lily bulbs on the hills, but they have never been developed for trade.

The island is submerged in its unbalanced excess of imports over exports. Its chief trade at present is the tourist business. The largest group is of people who go there for religious pilgrimages. March is said to be Buddha's birthday and July is the time when Buddha entered into the mountain for quiet devotion. Therefore March and July are two crowded periods for the temples, and also for the island. During the summer season the crowded condition is often accentuated by a number of vacationists who go there for recreation in July and August. The island has recreation and resort possibilities, but they need to be developed and put to better use. Its resources should be exploited for the economic good of the folk.

# FIXATION OF SHIFTING CULTIVATION

*Derwent Whittlesey*

SHIFTING cultivation is characteristic of the humid low latitudes, but many communities in these regions do not shift their fields at random among primeval forests and the jungly clearings of previous generations. Instead, they live permanently at one place, their fields are within practicable distance of their villages, and some land may be kept under cultivation year after year. This tendency for the agriculture to become fixed on specific lands is most marked where conditions depart most widely from the typical.

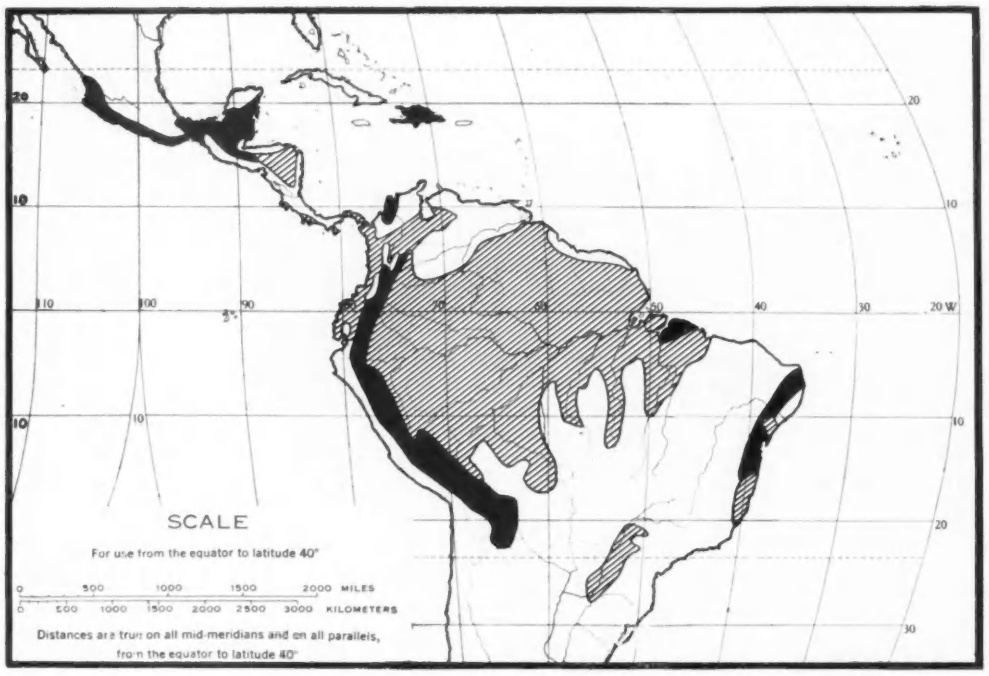
## AUTOMATIC FIXATION

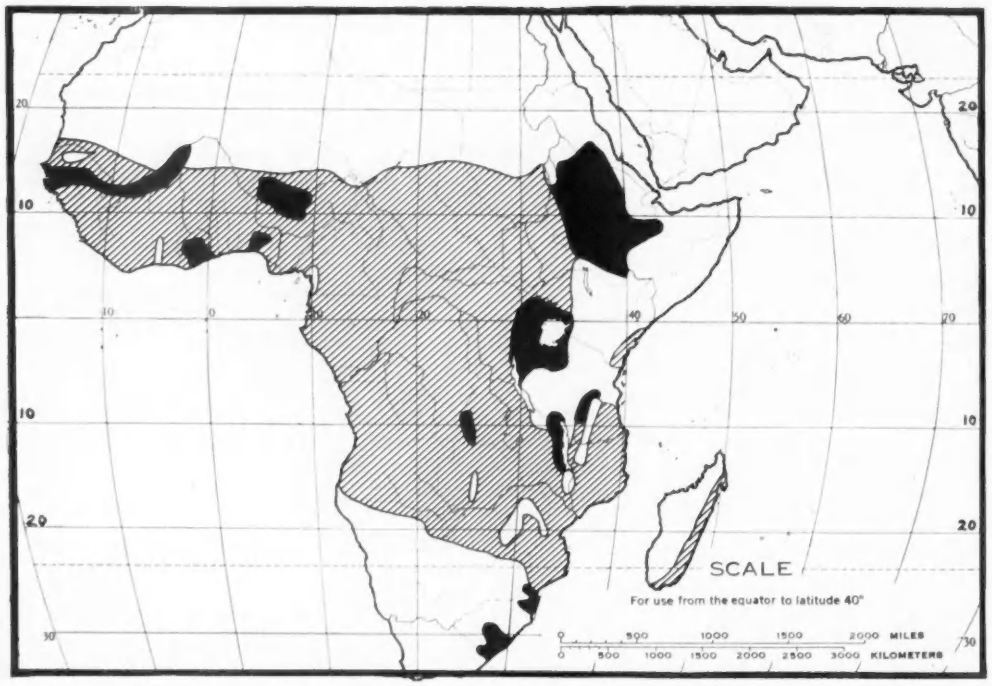
In places population is so dense that all the high bush (climax vegetation—rain forest or low-tree savanna) is cut over before the older clearings have rejuvenated themselves. This compels the people to put extra labor into clearing the tangled regrowing thickets. The laborious task can be accomplished because of the many available workers. In India, where the irrigation of rice and other crops has multiplied the food supply, shifting agriculture has disappeared, except in certain districts; so also in Java and in lowlands of Indo-China. The distinctively "oriental" types of agriculture practised in those places have no close affinity to the rudimental sedentary sort which is being considered in these pages.

Mountain and plateau lands often breed more people than they can support. Except in the narrow zone of cloud forest, vegetation is less urgent than on adjacent lowlands, and the native farmer is more nearly a match for it. He can extirpate the grasses which tend to replace forest or which make up the natural vegetation. Laterites do not form at the higher elevations, and on slopes erosion more than keeps pace with soil formation, so that exposures of fresh soil are more common than on lowland plains. One of the chief problems of the mountainside farmer is to keep soil on his fields, so actively do torrential rains wash it away. Highlanders may be unable to emigrate, either because the land is more productive than adjacent lowlands or because their rugged habitat is a refuge from more powerful tribes which have seized the lowlands. In time tribes occupying highlands acquire a dislike of low country. In the extreme case of the Andean puna the natives have larger lung capacity than is needed in the heavy atmosphere of lowlands, and they are susceptible to pulmonary disease when they go below to work. Whatever the cause, rudimental sedentary agriculture is the most widespread type in all the highlands of Africa, in the mountains of Indo-China and most of the nearby islands, and among the Indians of the American low-latitude highlands (Figures 1, 2, 3).

### Sedentary Farming in Low-Latitude Highlands

Perhaps the most distinctive indigenous sedentary agriculture of highlands is that of the "footplow" tillage in the high Central Andes. On the comparatively moderate slopes between about 11,000 and about 14,000 feet low temperature and adequate precipitation have produced natural grassland which forms a dense turf (Figure 4). In order to break this tough sod a pointed spade has been devised which utilizes for the thrust both a hand and a foot (Figure 5). Two men, each equipped with this implement, loosen a piece of sod, which a


SCALE
For use from the equator to latitude 40°
0 500 1000 1500 2000 MILES
0 500 1000 1500 2000 2500 3000 KILOMETERS
Distances are true on all mid-meridians and on all parallels, from the equator to latitude 40°




FIGURES 1 AND 2.—The regions of shifting cultivation and its modifications. Regions of sedentary agriculture are in solid black; regions of shifting cultivation are in cross-ruling. The agriculture of many small districts shown as practising shifting cultivation is actually sedentary; these patches are too small to be shown on maps of this scale. Most of the South Sea Islands, although not shown, are devoted either to shifting cultivation or to rudimental sedentary tillage. (Goode Base Map 201 H. C. Reprinted by permission of the University of Chicago Press.)

boy or a woman turns by hand. The field plowed in this laborious fashion is planted to potatoes (*Solanum tuberosum*), the only staple which can mature in this dour climate. The hardiest varieties are so bitter that they must be frozen, thawed, and squeezed of juice before they are edible. After potatoes, quinoa, a sort of millet (*Chenopodium quinoa*) is planted in rotation, the bitter

highlands of moderate rainfall is likewise based on tilling several fields in succession from a convenient and permanent base. The land not in crops lies fallow, and perhaps is grazed by animals (Figure 6).

The staple crop is usually a cereal, although root crops are also grown. In America the staple is sure to be maize wherever the precipitation suffices, and

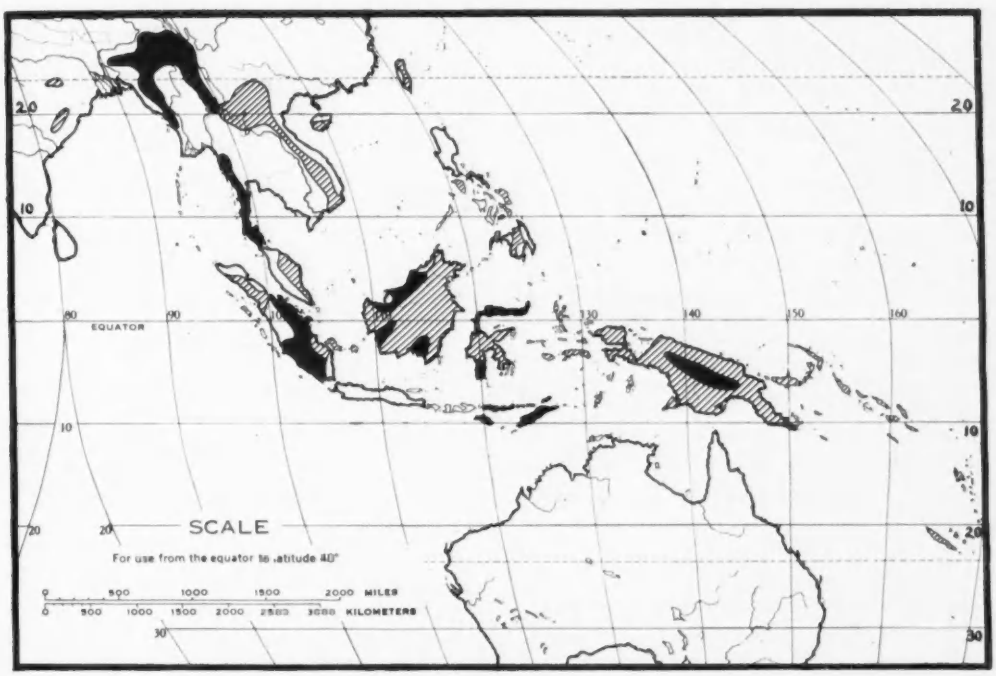



FIGURE 3.—The same phenomena of shifting cultivation are revealed in the Far East, where throughout Malaysia and its environs the same kind of change goes on as in the tropics of South America and Africa. Regions of sedentary agriculture are in solid black; regions of shifting cultivation are in cross-ruling. (Goode Base Map 201 H. C. Reprinted by permission of the University of Chicago Press.)

seeds being ground and washed to make a food similar in appearance to hominy grits or broken rice. Then follows a period of fallow years, during which llamas, sheep, and alpacas are pastured on the succulent natural grasses. Several years later the same land is again cultivated by the same farmer who does not migrate in search of new fields.

At somewhat lower levels, say between 4,000 and 11,000 feet, the agricultural system in many low latitude

wheat in the drier valleys; potatoes are the favorite root crop. In Africa most land is given over to one of the grain sorghums—durra (*S. vulgare*) most commonly; maize is grown in most places and acha (*Digitaria exilis*) where the soil is especially dry; manioc is grown scatteringly. In Malaysia dryland rice is the main crop, although maize has been introduced in some places. The kitchen garden, near the permanent village, contains vegetables,

FIGURE 4.—The treeless fields above a farm village of the High Andes. Ecuador, not far from the volcano Chimborazo.

gourds, root crops, oil seeds, and tobacco (Figure 7). Declivities are often chosen for fields because of their fertility (Figure 8). Where slopes are very steep terraces are sometimes built to retain the soil. These range from the megalithic walls of pre-Spanish civilization in the Andes to crude stone-and-brush contour ridges in Uganda, these last being designed to check sheet wash by forcing the torrential rains to deposit the silt in terrace form. The more highly developed tribes have gone so far as to straighten and riprap stream beds, but such careful works are exceptional. Hillsides 800 or 1,000 feet high are terraced in Peru and in the Angas hills of Northern Nigeria. The terraces of the Ifuago in Northern Luzon (Philippines) furnish the extreme example of sedentary farming in overpopulated highlands. Their crop is irrigated rice, however, and the farm system should perhaps be identified with the "oriental" agriculture of India and China.

Most of the work is performed with hand tools. The ground is prepared with either a form of hoe or a form of spade, depending upon local tradition. It is generally of iron, and must be shaped for the purpose, because primitive stick cultivation does not suffice where the same land must support the population year in and year out. Harvesting is always a hand operation, some form of sickle being used for cutting grains, and a hoe or spade for digging root-crops. Grain is threshed with flails or by trampling animals. The wind performs the winnowing. Since every grade of advancement exists, crude plows may be found in some places. Usually fashioned from a crooked tree crotch, and occasionally shod with a point of iron, these plows are pulled by oxen. In the American highlands asses and horses, as well as oxen, are occasionally employed for draft, llamas being used only as beasts of burden. There, on some treeless intermont basins, wooden plows are fairly common and imported makes are seen. The Indian laborer has been subjected to strong European influences, including race mixture, for four centuries. The highland basins of Mexico have reached a stage in which fixed subsistence farming has succeeded to rudimental sedentary tillage (Figure 9). Although not the same as the agriculture practiced in North China and in-

terior India, the two systems are alike in many ways. Maize and beans are the staples, with chili peppers, vegetables, and maguey (source of the native alcoholic beverages) as other important crops. Every farmer has poultry and a pig. Cattle, donkeys, and horses graze on the fallow and on land too dry to use for crops. Basutoland, South Africa, is a highland native reserve which has adopted European plows, in contrast to most African and Malaysian regions. The Basuto suitor with a plow is considered more eligible than his rival who depends on hand tools. In all the regions where plows have been widely adopted the fields are free from stumps and regrowing jungle.

Most of the livestock is the humped or zebu type of cattle. In the Andes above 8,000 feet llamas share the pasture. The fallow grazing is not fattening, since at these elevations the grasses are more likely to resemble harsh types of the lowlands than the nutritious varieties of the very high uplands. Alfalfa, elephant grass, and other succulent types might easily be planted, but no attention is paid to the fallow land. Where the highlands are dry for a long season the cattle business is important. In Africa it is usually in the hands of special tribes, such as the Fulani in the Nigerian Plateau and the Masai in East Africa. They graze their animals on stubble fields or on fallow lands and are strictly nomadic. During the wet season they move to land too dry for crops but affording a little grazing at the rainiest time of year.

The existence of herds permits variety in diet, although because of low grade stock the meat is neither fat nor tender, and the yield of milk is low. In the Middle American Highlands the cows can be milked only for a short time after freshening and since the calf is always kept to raise the owner muzzles the calf and takes a share of the small yield. Most of the equally meager milk supply of cows is turned into crude butter in Africa and Malaysia.

In many highlands long since denuded of forest, the only available fuel is dung. This deprives the fields of the enrichment which might be expected from the years when they are devoted to grazing. To expedite its collection, as well as to ward against predatory beasts, stock is usually driven into corrals or within lines of herders during the night.

In parts of Africa and Middle America some farm practices resemble the transhumance of middle latitudes. Certain tribes of Uganda send their herds up and down the mountains with the seasons in pursuit of newly greening pastures. On the steep shores of Lake Nyasa people climb and descend nearly a thousand feet daily at some seasons in

FIGURE 5.—The footplow of the High Andes. (Photo by Martin Chambi J.)

order to obtain maximum supplies from the wide climatic range their country affords. In parts of dry Eastern Brazil the people grow coffee on high slopes and sugarcane in valley bottoms. The longest treks are those to the outlying fields, made at planting and again at harvest time, but these are not related to complementary altitudes, and perhaps should not be considered as transhumance. In northern Guatemala Indians from near Coban plant fields more than fifty miles distant. Journeys in search of fuel wood may extend fifteen or twenty miles. If the source is still more remote, the wood is converted into charcoal by specialists and sold to farmers in village markets. Shorter trips are made frequently to fields as much as ten miles from the village (Fig. 10).

More typical than transhumance is the stratification of tribes along lines of altitude. Each group has learned to raise the crops adapted to its particular belt and to exchange with neighbors above and below. In Malaysia there are mountain ranges on which four such groups can be traced, and the phenomenon is common on the eastern side of the Andes and in East Africa. The uniform temperature throughout the year within the tropics makes this a more natural adaptation than transhumance.

### SEDENTARY FARMING IN DRY LOWLANDS

In lowlands where rain and drouth divide the year about equally a good many groups have learned how to keep down the grass growth which follows the clearing of the original open forest. In marginal zones the forest is less overpowering than in its heart, and yet there is enough moisture to permit the production of crops. Clearing the bush and annual burnings favor grasses, which encroach upon old fields. All are coarse, but some are suitable for pasturage, notably sudan grass (*Holcus sorghum sudanensis*) and paraguay grass (*Atriplex pampeana*). On a field they must be dug out patiently plant by plant with hoe, spade, or machete, in order to clear the ground for the staple

FIGURE 6.—Fields being harvested and sheep grazing in stubble. Plateau of Northern Ecuador, near Cayambé.

foods—sorghums, maize, beans, yams, peanuts, or a combination of these and cotton, the native source of clothing in these regions. Two regions typical of this agriculture are the dry São Francisco Basin of Eastern Brazil, and the Kano and lesser districts of Northern Nigeria. These regions can be farmed only if rather densely populated and supplied with tools somewhat superior to those of the typical migratory farmer.

FIGURE 7.—A hamlet with its kitchen garden. Nigerian Plateau.

Drouth is the perennial bugbear, and a series of dry years sometimes sets supposedly fixed populations to wandering. Other groups, preyed upon by nomads of neighboring semi-arid grasslands and deserts, are able to maintain stable habitations only by strong militant government. In places not effectively organized nomads occasionally overrun open woodland, leaving no refuge for the vulnerable farmer, with his wealth in immobile land and growing crops.

In the São Francisco Basin proper, livestock ranching is dominant, but on favorable borderlands tillage of maize and beans, with cotton, sugarcane, and coffee, is associated with the rearing of cattle and goats for meat and milk. Animals are tethered or leashed, to keep them out of the crops. In some places a little flood water is run onto crops, and everywhere agriculture is fixed. Crude methods of cultivation and fluctuating rainfall cause wide variation in outturn of crops. Maize is the staple; sugarcane yields rum and alcohol used locally. When drouth hits the region, people migrate from the livestock ranches to the moist borderlands in order to get some of the surplus food, which lack of roads precludes being sent out.

In Kano and other Northern Nigerian fixed settlements, field farming is restricted to the six months of the wet season. Sluggish streams, from which the water is lifted with the shaduf, maintain gardens throughout the dry

season (Figure 11). Cultivation is careful, only hand implements being used. With sharp edged, narrow hoes, ridges are thrown up at intervals of three or four feet. The crop is planted in the furrows, and at least twice earth is heaped about the plants, to extend their rootage and so guard against drouth (Figure 12). More than one crop may be planted in a single field, for example durra and bulrush millet. Since the latter matures in three months while the former requires five, there can be two harvests. The adze or the sickle is used for reaping, and during the ripening period birds have to be constantly chased from the fields. Other staples are peanuts and cowpeas, at once food and fertilizer, manioc, and cotton. This being Moslem country, it is one of the few places where no crop is grown to make fermented liquor. The particular crop dominant varies with local conditions, mainly with the length of the rains and the permeability of the soil. On light, sandy soils peanuts and bulrush millet are favorites. In the moist soils slower growing varieties of sorghum and the root crops are more in evidence. At least eight major varieties of millet and sorghum are common in the Western Sudan, varying from a short stemmed plant producing a small, glassy grain of high quality that will keep two years, to coarse grains fifteen feet tall. Everywhere the outturn is relatively low.

Regular fertilization of the soil with manure is practised only near towns where beasts of burden are numerous. This springs from the fact that the tribes which own the cattle do not till the soil, and so have no direct interest in its fertility. Quite commonly cattle are turned on to recently harvested fields, a benefit the farmer is willing to pay for.

The table on page 147 is a crude measure of the importance of agriculture in regions where the rudimental sedentary

FIGURE 8.—Fields and natural vegetation on a steep slope; most of the planted land is under maize. Atlantic slope, Guatemala.

TABLE OF NATIVE OCCUPATIONS IN NORTHERN NIGERIA, 1921

| Occupation | *Kano Province* | | *All Northern Nigeria* | |
|---|---|---|---|---|
| | *Male* | *Female* | *Male* | *Female* |
| Agriculturists | 75.0 | 47.6 | 77.5 | 41.9 |
| Fishermen | .6 | ... | .9 | ... |
| Traders | 3.5 | 2.2 | 3.6 | 6.9 |
| Textile Workers | 11.0 | 29.9 | 8.3 | 15.5 |
| Artisans | 1.6 | .3 | 1.7 | .4 |
| Housewives | ... | 20.0 | ... | 35.3 |
| In European Service | 8.3 | ... | 8.0 | ... |
| | 100.0 | 100.0 | 100.0 | 100.0 |

Data from Meek, C.K.: The Northern Tribes of Nigeria, London: Milford, 1925.

type dominates. Kano Province is the most intensively farmed spot in Northern Nigeria, but the presence of the metropolis increases the proportion of other occupations. In Northern Nigeria there is much land devoted to shifting cultivation, and some which is occupied mainly by nomadic herders; this diminishes the accuracy of the table.

### SEDENTARY FARMING IN HUMID LOWLANDS

In a very few lowland regions naturally very humid the natives have fixed their agriculture, owing to pressure of population. In certain sections of Haiti, the tenacious lowland grasses and weeds are laboriously dug out with machetes. In Southeastern New Guinea the grass is first burned, after which many men in a row, armed with strong, sharp stakes, dig up the turf in unison. In the dryland rice country of Borneo much the same conditions exist.

In Southeastern Asia, notably in the Indo-China Peninsula, the indigenes have discovered the utility of aquatic crops. Since the ponds in which these

FIGURE 9.—A new village and newly laid out subsistence fields on the Mexican Plateau. Maize is the principal crop; the white rectangles are bare fields; sheep at graze on the slope in the foreground. Taken from the Cholula Pyramid, near Puebla.

FIGURE 10.—Women carrying provender home from outlying fields. The nearest village is six miles away. Nigerian Plateau.

plants grow are localized, and since the soil of their beds is not subject to exhaustion, this practice tends to fix the farmer. Differences in bottom and in depth are reflected in the kinds of plants grown. On shallow margins less than a foot deep, grow certain lotuses. Farther out are the larger water lilies. Then there are the floaters, such as lemnas or duckweeds, eaten by ducks, which constitute an important element in the plant and animal association.

A few tribes of the Guinea Coast, in what is today Dahomey and Southern Nigeria, became fixed under the compulsion of slave raiding. In order to escape capture they had to gather in walled towns. This restricted the radius of farming operations, and the crowding of population furnished the labor necessary for somewhat intensive farming. The experiment was cut short by the abolition of the slave trade before all the high bush had been destroyed. Some shifting of fields and farmers probably persisted. Today shifting cultivation is practised in many parts of the area.

## FIXATION OF NATIVE FARMING BY OUTSIDE INTERVENTION

With the incursion of Arabs, Europeans, and Chinese into regions of shifting cultivation, the objectives of farm production have somewhat changed. If the forest contains some coveted prod-

FIGURE 11.—A garden irrigated from a small stream, near Kano, Nigeria. Dikes separate the plots; crop trees grow here and there, especially along the stream.

uct, such as rubber, compulsory collecting is superposed on the system; if an agricultural crop is wanted, plantation agriculture may be instituted, or else the native farmer turns to growing the crop for sale to the outsider. These modifications of primitive practice all tend to fix the habitation, to reduce the radius of the farming operations, and to put some land permanently under crop.

The outsider reorients the native life, because his points of contact are generally harbors along the coast. On them commercial towns grow up. Navigable streams are routes for penetration, and river towns take their place in the system. Finally railroads and motor roads are built, giving to narrow zones especial value because there stand the market towns where farm products can be exchanged for trade goods (Figure 13).

FIGURE 12.—A field of light and pebbly soil prepared for a grain crop, probably acha. Nigerian Plateau. The sun helmet in the foreground gives the scale.

## THE EFFECT OF COLLECTING FOR EXPORT FROM THE LOW LATITUDE BUSH

The low latitude bush is a reservoir of useful products. Migrant farmers have always tapped it to supplement their gardens, and when outsiders began the exploitation of the low latitudes, forest products were among their first takings. Spices of the Moluccas, small East Indies islands, were drawn upon by Asiatics and passed on to Europeans long before the Age of Discoveries. Ivory has moved out of Africa since Antiquity. Ruthless plundering began with ocean voyages of the 15th century. In less than 500 years Europeans had destroyed or depleted nearly all the marketable products of the bush. Today little business remains. In the process the indigenes were profoundly affected. Having at first no wants which would induce them to work for the intruder, they fled into the depths of their forests, leaving zones of depopulation along the routes followed by the newcomers. On islands, highlands, and open plains they could easily be caught and forced to work; in the denser bush and in continental areas this task was accomplished only after 400 years of effort. When the forest has yielded its toll, the inhabitants who have been engaged in collecting are left with a taste for imported cloths, utensils, and finery. A few traders remain in the towns, and the government seeks a substitute for the vanished revenue. In favored spots plantations are set up. Over most of the area a modified shifting cultivation gradually reasserts itself, with sedentary farmers near the towns and along the routes which remain in use.

## FIXATION IN CONNECTION WITH PLANTATION AGRICULTURE

Collecting is at best a short-lived undertaking, and most of the low latitude crops which are persistently in demand have been grown on plantations at one time or another. A discussion of plantation agriculture, a strictly commercial type, is out of place here, beyond noting

its effect on fixing indigenous agriculture.

Since no plantation crops are staple foods and many are not foods at all, the laborer who does the work must be fed from some other source. Ordinarily, workers and their families are allowed to squat on land owned by the planter, but not suitable for his cash crop. There they grow their food crops, by hand, but using tools of European or American manufacture. The work is accomplished in spare hours, or with the aid of members of the family not engaged on the plantation. Because the laborers must live within reach of the plantation, they work the same land year after year, perhaps letting each plot lie fallow once in several seasons (Figure 14). Since they can buy food with their wages, they depend in part on imported provender, especially salt fish, which is their staple meat.

### FIXATION IN ORDER TO GROW CASH CROPS

Contact with the commercial world has called into being a third type of sedentary agriculture, intermediate between collecting forest products for export and crop growing on plantations owned and managed from the middle latitudes. This is the production by indigenous groups, on their own land, of crops which they can sell to traders.

Of this type of sedentary agriculture the most obvious, although the latest to develop, is the growing of vegetables, fruits and other produce for sale to townsfolk whose business leaves them no opportunity to raise their own food. The market includes the foreigners in every commercial town and mining camp, and also the considerable number of aborigines who are attracted to such places by high wages or steady jobs. In the vicinity of Lagos, the metropolis of Nigeria, Dakar, the capital of French West Africa, the mining centers of Katanga in the Belgian Congo, and similar places in the other continents, market garden districts have grown up. Crops are much the same as on the shifting farm, and all the work is done by hand, but the same gardens are cultivated year after year, and intensive methods, in-

FIGURE 13.—About one-quarter of the large native city of Ibadan, Southern Nigeria. Formerly a town surrounded by gardens enclosed within the walls, Ibadan has been reroofed with corrugated iron and the wall has melted into the moat from which it was dug, since the coming of the British.

cluding fertilizer and even irrigation, are in force.

Far more widespread than local truck gardening is the growing of certain particular crops for the world market. This has revolutionized farm life in many a district formerly devoted to shifting cultivation and has affected some groups which had already become quasi-sedentary.

In a few cases, the indigenous farmer has learned that some item of his ordinary crop association can be sold for cash, now that improved transportation has put him in touch with a wider market. Kola nuts, in constant demand throughout the Western Sudan, are raised in swiftly mounting quantities in Southern Nigeria in a district on the railroad line which penetrates farthest into the Sudan. Yerba maté of the Upper Paraná Basin is a crop of the same type, now sold in large quantities throughout South Brazil, and Paraguay and Argentina, where it is the "tea" of the country. The market for most peasant crops is not up-country, however, but overseas. The denizens of hundreds of Pacific islands sell their coconut meats (copra) to coasting ships which finally assemble the product in a few entrepôts for shipment to Europe and North America. The oil of the West African oilpalm, used by the Africans for cooking and for annointing hair and bodies, finds a ready market among occidental soap manufacturers (Figure 15). Chinchona, from the forests of the eastern Andes, becomes quinine in the international pharmacopoeia. Cotton in the Sudan and the East African highland is now grown for sale as well as for local use. An immediate effect of the new outlet is to reduce local consumption. Subsequently more care is given to the crop and improved methods, often suggested by the buyer, increase the outturn. In time acreage is extended, if the demand continues to hold up.

FIGURE 14.—A farmer at work with a mattock, weeding his hillside garden of taros. Sugar-cane plantations occupy the lower slopes, and subsistence gardens such as these the remoter and steeper declivities, of Mont Pelé, Martinique, French West Indies.

The native grower rarely keeps a monopoly long, because any crop in demand suggests itself as suitable for plantations. If production on plantations improves quality or yield, or decreases cost, the indigenous farmer may lose his market altogether. Chinchona grown on plantations in Java has a higher alkaloid content than the native Andean product, and now supplies 90% of the world market. Palm oil from plantations in Sumatra is superior to that of the Guinea Coast and is increasingly cutting into the market of the older center.

The peasant farmer does not always lose out to the planter. The history of plantation agriculture has been the attempt to grow each crop in a great many different parts of the earth, usually places politically controlled by the several colonizing powers. This has had the effect of introducing every cash crop of the low latitudes to every region where it can grow. In some cases conditions are more suitable in the new environment than in the old. This is well illustrated by cacao, which was for centuries a plantation crop in low latitude America, the land of its origin. Introduced to the Guinea Coast it grew well among the tree crops on peasant clearings. The tree requires little attention,

and the labor of preparing the cacao kernels for shipment is prolonged but simple. Then an incurable disease attacked the plantations in Ecuador, the chief producer. At about the same time the World War reduced available shipping and redoubled the demand—the chocolate for quick-acting food and the cocoa butter for explosives. The powerful stimulus of these coincidental forces intensified production in places nearer the theater of war and on land free from disease. Coastal Brazil, where plantations had been superseded by peasant production, rose to second rank among producers. British West Africa, where peasant production is universal, and still nearer Europe, swiftly took leadership. Gold Coast, where trees had been planted about 1900, rose to first place, followed by Nigeria (Figure 16). French Africa, where the business was confined to plantations, could not expand rapidly during the War—a time when capital from France was unavailable. Today about two-thirds of the world's cacao is grown on peasant holdings.

Other plantation crops which have had a similar, though less spectacular rise on peasant lands are rubber, tobacco, cotton, and coffee. Rubber began, not as a plantation crop, but as a product plundered from the low-latitude forests of America and Africa. The business was then captured by plantations of southern Asia and adjacent islands. The urgency of the World War, added to a sharply rising normal demand, brought many peasant farmers into competition with neighboring plantations in Ceylon, Malaya, and the Dutch islands. Today peasant production is a formidable rival of plantation produce.

The methods of indigenous farmers are sometimes crude and nearly always careless. As a consequence their product fetches a lower price in the market than plantation-grown crops. Gold

FIGURE 15.—An orchard of oil palms, made by clearing out the rest of the natural vegetation over a period of many years. Niger Delta.

FIGURE 16.—Cacao beans drying in a village of Southern Nigeria. The trees are planted among the forest giants which rise behind the huts. The light truck is there to pick up a load of the sacked and dried beans.

Coast cacao is often hurried through the drying process, in order to realize cash more quickly. As a result it is likely to be discolored, and it may be mouldy. As received from the farm, a third contains 10% or more of mouldy beans. Sun-dried copra sold by weight is left moist to make it as heavy as possible, although in that state it often moulds. Palm oil generally reaches the market rancid. High grade cotton is allowed to cross-fertilize with inferior stock. Rubber trees are carelessly tapped, so that dirt gets into the latex. The peasant farmers can continue to produce at a lower price than planters receive, because their costs of production are low. Even so, when the price falls, they are the first to be forced out, despite redoubled efforts to maintain their cash income by increasing their output. This is well illustrated by rubber chronically overproduced ever since the end of the World War, thanks to increasing re-use of old rubber and improved durability of tires, which have combined to offset the increasing use of rubber goods.

All the crops thus far referred to grow on trees. Even the native cotton of the low latitudes is a perennial bush. Since trees must remain on the ground for many years, the possession of these cash crops is modifying the life of the migrant tribes profoundly. In order to remain near their trees, they must continue to plant their subsistence crops on the same group of fields. This permits little fallowing, and no abandonment of crop land to nature for complete rejuvenation. It is too soon to determine whether or not sedentary agriculture can succeed on soil not specially suitable. To make a go of it, some method of fertilizing the land must be found, and intensive methods will need to be introduced.

With the introduction of American

varieties of cotton, that crop is becoming an annual. A number of food crops, likewise annuals, are sold if there happens to be a surplus and also a market. Among them, peanuts have come to occupy a special place as a cash crop. Peanut oil competes in Europe and North America with palm and coco oil, and is the major cash crop of parts of the Sudan. It was introduced about half a century ago. Since peanut plants add nitrogen to the soil, this crop helps to fix the agriculture of migrant groups. It has put on a commercial basis the agriculture of communities which were already sedentary when they began to plant peanuts. Unlike the tree crops and cotton, peanuts have never been grown on plantations.

This commercially induced and quasi-sedentary agriculture has perhaps succeeded best to date in British West Africa. There outsiders are not permitted to take up land; hence the best soils and locations remain in native hands instead of being taken for plantations. The government and organizations of buyers retain agricultural experts to study ways of improving output, to discover new cash crops, and particularly to train the natives to prepare their crops carefully. Government inspection of produce before it is admitted for sale is another effort to offset careless native methods.

Everywhere the outside contact which created the market and in many cases introduced the cash crop, continues to influence the indigenous grower. He uses tools forged in factories in Europe, North America, or Japan. He is encouraged to introduce the plow and other large-scale machinery, although only in America has he done so to any notable degree. Apart from fixing his abode, the most fundamental change in his life is the substitution of individual for collective land tenure. Before this can take place the people must acquire a wholly novel concept of property, since by their custom the tribe retains ownership of all land, issuing it to the native to use as needed. Individual ownership of the crop is customary however, and when the crop is a planting of trees which remains indefinitely on the land, the land and the crop become identified. Generally European governments favor the adoption of individual ownership of land, because they believe that if it has a stake in the land, a family will weed and hoe more carefully, and fertilize the soil on both cash and subsistence crop plots.

The changeover from shifting to sedentary farming is probably the most significant agricultural revolution in process today. As yet it is far from complete. Most groups still shift fields from time to time, while retaining certain plots permanently under a cash crop. On the other hand, there are very few districts totally unaffected by the possibility of selling something to the omnivorous trader from the middle latitudes.

This paper, like its precursor, derives from earlier studies by Wellington D. Jones and the author. The revised maps, the text, and the photographs (with one exception noted) are by the author, and have not been seen by Professor Jones.

# AGRICULTURE IN THE LLANO ESTACADO

*W. A. Browne*

THE extensive type agriculture characterizes present development in the Llano Estacado. This condition is observable in the size of farms, type of machinery used, scale of operation, and per capita production. The farmers direct their attention upon the areas cultivated rather than upon acreage yields. The wheat farmer in the northern part of the region who raises on an average of fifteen bushels of grain to the acre produces more grain on his large farm than does one in the eastern part of the United States with higher acreage yield but far less acreage. Likewise the cotton grower in the southern part of the region who produces one-fourth to one-third bale of cotton to the acre gets greater total returns than does the farmer of the Cotton Belt proper with higher acreage yield.

The region is no longer primarily devoted to the pastoral industry, as many are wont to consider. When population was sparse, with little or no provision for transportation, the cattle and sheep industry was the logical form of land occupancy. With increased number of occupants, however, came dependence on less per capita land acreage, consequently the land came to be used more intensively. The building of railways made possible this modification, since certain farm crops could be disposed of which heretofore could not be economically shipped to markets. Yet with relatively sparse population, hence limited consumption within the region, the production was for some time confined almost exclusively to commercial crops. The passing of the specialized livestock industry to that of a specialized crop-producing program, therefore, was a predictive change in land utilization.

Present conditions of development offer opportunity for more diversity in agricultural production. The increased population, particularly that of the urban centers, provides a limited local market, and the conveniences in transportation make possible the marketing outside the region of practically any type of agricultural product. Greater quantities of the products that ship well, as meats, grains, and cotton seed products, are consumed in the region, while some of the most favored localities for growing vegetables and melons supply a portion of that class of products demanded in the cities and towns. The newly established dairy industry supplies most of those products used in the region, with a surplus of the

FIGURE 1.—The Llano Estacado, showing the counties and principal towns and cities.

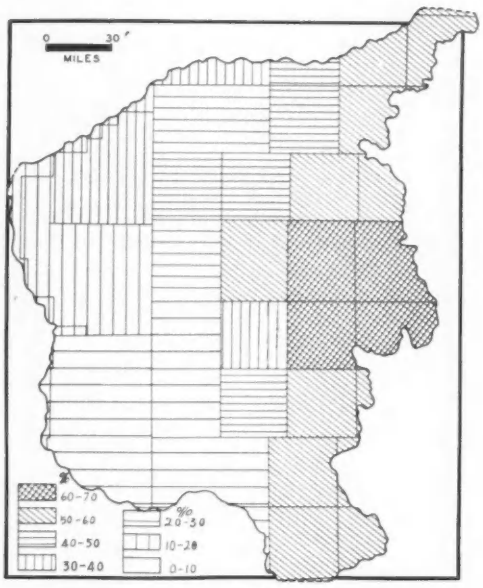



FIGURE 2.—Land of the Llano Estacado showing percentages under cultivation. It can readily be seen that the major part of the cultivated land is in the rainier eastern part of the region. (U. S. Census Report 1930.)

refined products for shipping to points outside the area.

The agricultural industry is of far greater relative importance than is generally realized. Being of recent emergence from a pastoral land, and development rapid, the area has been transformed into an agricultural region more completely than is held by the average opinion. This may be shown by comparisons. It is estimated that 21.4 per cent of the United States is in improved farm lands, the percentage for the states of Texas and New Mexico being 20.7 and 2.3 respectively. The percentage of these lands in the Llano Estacado amounts to 29.02 per cent. In some counties of the region the cultivated lands occupy two-thirds of the entire areas (Figure 2). Likewise the importance of the agricultural crops as compared to that of the livestock industry is equally surprising. The value of all crops for 1929 was $79,680,005 while all livestock was valued at $36,621,768. Even more striking is the fact that the sale of dairy products for the same year amounted to $4,668,817. Thus it is readily seen that the region is no longer a pastoral country. The returns from agriculture amounted in 1929 approximately to $250 per capita for the people of the region, or some $575 each for the strictly farm population. Although this income is derived chiefly from wheat, cotton, and grain sorghums, several forage crops are grown and fed to dairy cattle, beef cattle, hogs, and poultry, thus giving an important indirect source of income from the agricultural crops.

The data for counties only partially within the region were secured primarily from county agents and assistants to county agents. It was fortunate, for the accuracy of this work, that the agents were engaged in the agricultural program instituted by the National Government, at the time the data were collected, since from this work the agents had become quite familiar with statistics of crop production, livestock, etc.

The agricultural industry is quite dependent on conditions of rainfall, as may be seen in the relationship between distribution of rainfall and crops over the region (Figures 2 and 3). Crop production in general is by far the most thoroughly developed in the eastern portion where rainfall is greatest, and the dropping off in amount westward is in general quite in agreement with the decline in amount of rainfall in that direction. The variations in soil conditions are such as to be considered in locating different kinds of crops, and doubtless this fact will be given more attention as the region is more thoroughly developed, but, thus far, the agricultural industry considered as a whole shows little variations from one type of soil to another (Figure 4). The areas of dune sands, being in the western part of the region

where little cropping is done, are not conspicuous in general production, even though these soils have been particularly avoided by the agriculturist. At present the distribution of production and the importance of certain crops are of sufficient significance to warrant treatment.

## WHEAT AND THE WHEAT SECTION

*The Wheat Crop.* Wheat ranks second in acreage among the farm crops of the region, being exceeded only by grain sorghums. In 1929 the land planted in wheat totaled 1,581,024 acres, which produced 24,090,114 bushels of threshed grain. At present (spring 1935) market prices the crop would have been valued at about $22,000,000, which sum is equivalent approximately to $72 for each individual in the Llano Estacado, and about $500 per capita of farm population in the wheat section.

Three varieties of wheat are grown—winter wheat, spring wheat, and Durham or macaroni wheat. However, the crop is chiefly of the winter variety. Floyd County leads in the production of the spring and Durham varieties, with some 900 and 200 acres of each respectively. Randall County raises about 600 acres of both varieties, but no other county produces as much as 400 acres of the two. Being grown under semi-arid conditions, the wheat has unusually high gluten content, and flour from it is prized for its excellent baking qualities. The wheat frequently sells at a small premium on the market.

Wheat raising in the region has been developed into a rather definite system. While this in general is true, the details are necessarily varied according to conditions of rainfall, wood-growth, and, to some extent, the size of the farm. Land that is used regularly for growing wheat is almost continuously covered with wheat, or is kept in a fallowed condition for the conservation of moisture and as preparation for sowing the grain. If weather conditions are favorable, the land is plowed immediately after wheat harvest, in order to cover the wheat stubbles and prepare a deep mulch for conserving the moisture received during the remainder of the summer. In some years the rainfall of late summer is sufficient to germinate the shattered wheat and weed seeds, which makes necessary a second shallow cultivation to destroy the growing plants. If the land is seeded with wild winter grass, a third cultivation is sometimes necessary, since this weed does not grow until cool weather sets in. In some cases good stands of wheat are plowed up late in the fall in order to kill this growth that has developed after wheat sowing, following which the land is reseeded.

At least two slightly different methods of sowing wheat are employed. A quite general practice is that of using an ordinary hoe drill which leaves a series

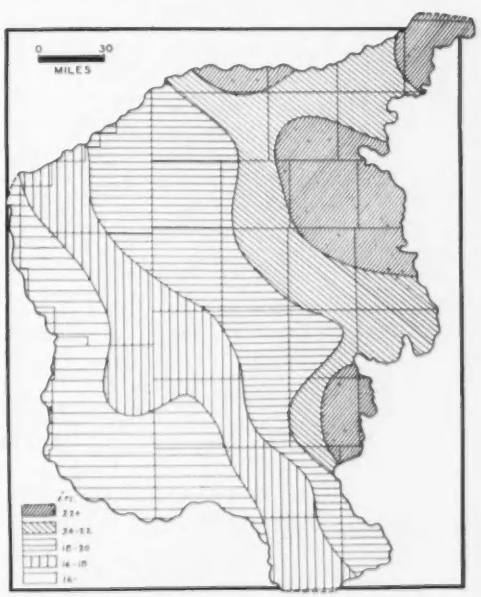



FIGURE 3.—Rainfall of the Llano Estacado, showing amounts in inches and geographic distribution. By comparing this map with that of Figure 2 the relationship between rainfall and lands under cultivation is brought out. (U. S. Weather Bureau Report.)

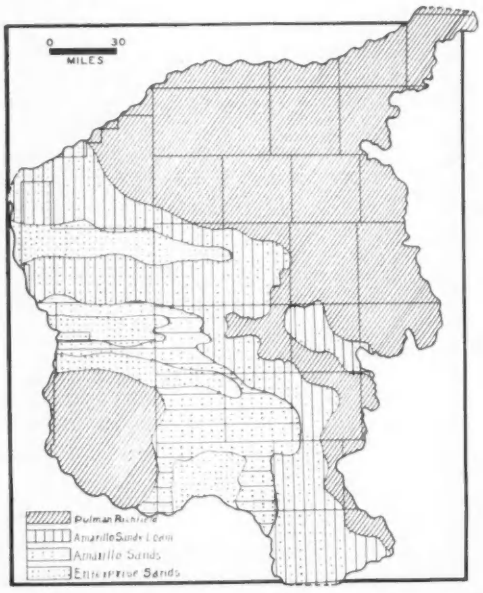



FIGURE 4.—The major soil groups of the Llano Estacado. Two things concerning the soils are quite observable—the large area of dark soils in the northeastern part of the region, where rainfall is sufficient for a heavy grass cover and is less subjected to encroaching sands, and the abundance of light-colored soils in the western and southern portions, where vegetational decay is scarce and eolion sands conspicuous. (After the Soils of Texas, University of Texas Bulletin 431.)

of furrows and ridges. These not only serve well in catching snow and other moisture, but give protection to the plants and lessen wind erosion. However, if the moisture is sufficient for the wheat to grow well, the soil blows but little. An improved drill, very popular in recent years, is essentially the same as the preceding except that it is equipped with a sort of sweep device fixed in front of the drill hose which destroys weeds, thereby making unnecessary, in most cases, cultivating the land just before planting.

Little or no attention is given to the wheat between the time of planting and harvesting. Some farmers practise using the wheat fields for pastures until about March 1, but this is considered by many to be injurious to the wheat, particularly if the autumn and winter rainfall is below normal. Most of the harvesting is done in the latter part of June unless the wheat is hampered by abnormal weather conditions. Topographic conditions are highly favorable for using the combine harvester and thresher and rainfall hampers little at this season, therefore practically all the wheat is harvested by this extensive method. Since the grain ripens in a vast amount of sunshine and dry atmosphere, it usually is in suitable condition to be stored as harvested.

The disposal of the threshed wheat constitutes an important business. The following quotation from *The Amarillo News and Globe*, July 1, 1934, suggests the magnitude of this business: "Nearly one-half million bushels of wheat moved yesterday into Amarillo from all sections of the Panhandle-Plains. Grain shipments have been unusually heavy for the last week. One week ago yesterday more than 360 cars of grain were shipped into Amarillo; yesterday there were 325. The record shipment here was established in 1931 when in one day 515 cars were received and inspected." Since most of the wheat is threshed as cut, movement of the grain begins with the harvest season. The wheat may be trucked directly from the field to local elevators. These structures usually are easily reached, since they are present in almost every town and village of the wheat producing area, and many are located at convenient points along the railroads without respect to towns. The wheat may be held in the elevators to await increase in prices, but because of the scant population much of the product is eventually marketed outside the region. However, before shipping, a considerable percentage of the crop is manufactured in the local flour mills, which are to be seen in all the larger towns of the wheat section. Also there are elevators in the larger urban centers where great quantities of the wheat may

be stored for several months before being shipped out to market. The largest of these is the Burrus Elevator located at Amarillo, of 2,000,000 bushels capacity (Figure 6).

*The Wheat Section.* Wheat raising is so dominant in the northern part of the region as to give to that section some degree of individuality. The area covers most of the region from about Plainview northward except a portion of the extreme west (Figure 7). Over most of this area the Amarillo loam and Richfield clay loam soils are well adapted to crops further tend to distinguish the wheat section from other portions of the region, particularly the cotton section. The average size of farms in Castro, Deaf Smith, Randall, and Swisher counties, all of which are entirely within the wheat section, is 613.9, 703.5, 668.2, and 524 acres respectively, making an average of 627.4 acres for the four counties. These averages are far larger than those of the farms in the cotton section, the respective acreage of farms for Lubbock, Hockley, Terry, Lynn, and Dawson, all entirely within that area, being

FIGURE 5.—A typical view of a combine at work in a wheat field of the Llano Estacado. Level lands and an abundance of dry weather and sunshine at the harvest season provide excellent conditions for the use of this machine. Practically all the wheat is harvested by this method. (Courtesy of McCormick Company, Amarillo.)

wheat production, and the fifteen to twenty-three inches of rainfall, coming chiefly when needed for wheat growing, favor the wheat industry. Only minor interest is shown in cotton, the leading crop just south of the wheat section; the latitude, in conjunction with the considerable altitude, limits the frost-free season to 200 days or less, and produces cool nights and occasional cool spells throughout the summer season, both of which are unfavorable to the growth of cotton (Figure 8).

The size of farms, value of farm equipment, and amount of land in minor

203.6, 257.7, 314, 221.7, and 238.4 acres. Furthermore, there have been a number of large-scale projects in wheat farming that included thousands of acres each.

The same trend is shown by the differences in value of farm implements and machinery in these two sections. The average value of this equipment for each farm in the counties of the wheat section referred to above is $1,962.89, while the average value of that of the farms referred to in the cotton section is $491.62. The general use of extensive-type machines accounts for the high average

value. The expense of equipping a typical wheat farm is about as follows: tractor $1,500, combine $2,000, wheat drill $325, disc plow $225, cultivator $225, planter $160, wagon $125, harrow $35, a total of $4,595. If the farmer owns a truck, that item will add about $1,000 to the cost, making the expense of the machinery well above $5,000.

As previously stated, crop production in the wheat section is not confined to wheat. A number of crops, including grain sorghums, oats, barley, and rye are grown. The grain sorghums make up the most important crop of this list, but because it is so widely distributed over the region it will be treated separately. Barley and oats are grown rather widespread, reaching as high as 8,000 acres for each of these crops in various counties. Rye is grown only to a limited extent, but the presence of the crop is suggestive of the cooler temperatures of the northern part of the region. All these crops, except grain sorghums, fit well into the farm program of the wheat section; since the same machinery is used for these crops that is used in producing wheat, and work in caring for them does not conflict greatly with that of wheat raising. Most farmers have retained a small field of native grass for pasturage, and many practise sowing ten or fifteen acres of sudan grass each year for this purpose.

The wheat farmer is not free from problems, such as wind erosion, ravages of insects (cut worms, and grasshoppers), development of smut and rust, and growth of winter grass, to which reference has been made. Of this list, wind erosion is the most serious. The soil blows most in droughty periods, but gives some trouble at all times, particularly in the spring season when wind movement is greatest. Cultivated lands are most affected, and in extreme cases holes sufficiently large to hide a tractor have been blown out in wheat fields, while in other places drifts deep enough to cover wire fences have been formed.

FIGURE 6.—Wheat elevators are conspicuous objects in the wheat section of the Llano Estacado. On the left are shown the Burrus Elevators, the largest in the region, and on the right the Farmers Corporation Elevators. The 2,000,000-bushel capacity of the Burrus Elevators suggests something of the magnitude of the wheat industry of the region. (Courtesy of McCormick Company, Amarillo.)

This drifting is most common about fences where obstructions to blowing soil are formed by collections of Canadian thistle. The removal of the soil in some instances leaves the roots of the wheat so exposed as to be damaged from frosts, and the blowing particles are injurious to the tender plants. Planting the grain in shallow furrows and discing winding strips over the wheat fields serve both as prevention against erosion and protection for the plants. Since, of the plowed lands, those freshly worked blow least, idle fields are in some cases cultivated as protection against wind erosion.

Of the pests, a type of cut worm is the most destructive. The insect does its work in the fall, when the wheat is small, by cutting the plants off just below the surface of the ground. Although loss

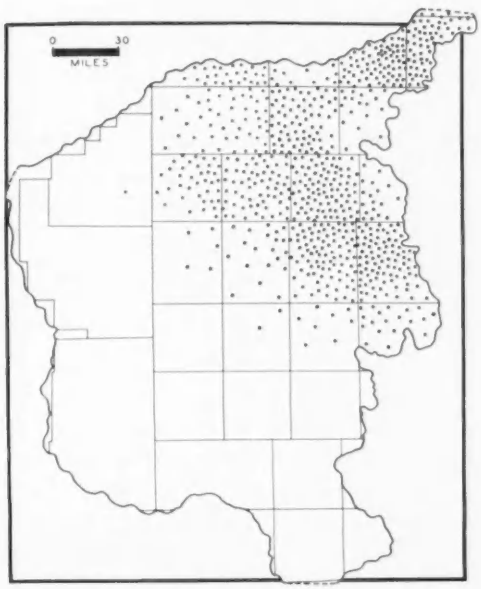



FIGURE 7.—Practically all the wheat of the region is produced on the dark, heavy soils of the northeastern part. By referring to Figure 4, the close relationship between the dark soils and wheat growing can be seen. One dot equals 2,000 acres. (Census Report, 1930.)

from this source is not very frequent, in extreme cases the pest has been known to destroy fifty per cent of the wheat in a field. Grasshoppers give some trouble, especially about the edges of the fields. They are at their worst in the autumn just before freezing weather sets in, but do some damage in the spring also. They tend to remain along the fences in the middle part of the day, where they seek protection from the sun, and advance twenty-five or thirty feet into the fields. The wheat is completely destroyed as far as they reach. Rust sometimes appears, but the dry climate prevents this disease from being a serious problem. Smut is slightly more destructive. It occurs once every four or five years, and in severe cases destroys probably five per cent of a field of wheat. The disease not only injures the growing wheat, but the threshed grain is often badly affected and consequently is docked four or five cents a bushel on the market. Danger from this source may be eliminated by treating the seeds before sowing.

### COTTON AND THE COTTON SECTION

*The Cotton Crop.* The cotton crop is dominant, both in acreage and value of the product in the southeastern part of the Llano Estacado. The cotton in this section, as is the case of wheat in the wheat section, is the chief source of cash income among the rural population. In 1929, 1,360,521 acres were planted in cotton, and the income from this source was more than $4,000,000. Economic conditions of the section are quite dependent on the quantity of cotton grown and the market price of the products (Figure 9).

Cotton production in the Llano Estacado is carried on quite differently from that of the South in general. As is typical in semi-arid lands, fields are large and the extensive-type farm machinery is used, including two-row listers, two-

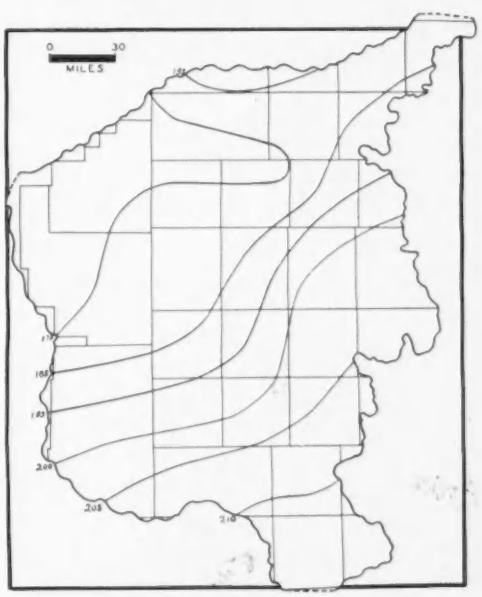



FIGURE 8.—The position of the isochronal lines are determined by both latitude and altitude, the two factors of about equal significance. The northward projection of cotton along the eastern border of the region, Figure 10, is quite in keeping with the projection of the longer growing season in that part. (U. S. Weather Bureau Records.)

row "go-devils" (a machine that is drawn in the furrows with knives attached on the sides for cutting into the ridges to destroy weeds), and cultivators. Most of the planting is done between May 5 and June 1, with a lister equipped with a planter attachment. The seeds are planted in the bottom of the furrows both because of the moisture problem and for ease of cultivating the crop. While the plants are small the go-devil is used for destroying weeds, but later discs and cultivators are used to work the soil into the rows and lower the ridges. Unless rainfall is above normal little hoeing is necessary, and "chopping" out the cotton is no longer practised in the region. If rain falls frequently through the summer, the fields are cultivated rather deep occasionally with a regular cultivator, in some cases using wide sweeps to destroy the weeds; if the rainfall is scant, a few shallow cultivations are given to maintain a mulch for conserving the moisture. Plowing is discontinued in the first half of August; since by that time, the plants are almost mature and the "squares" are beginning to form.

The picking does not differ materially from that of the Cotton Belt in general, except that frost occurs earlier, after which the dead bolls are soon dried, by the dry atmosphere, and can be pulled, eliminating the necessity of picking the fiber. The picking requires extra help, so it has become a custom for Mexican laborers to drift into the region for the harvest season.

The cotton farmer has several problems with which to contend. The strong winds at planting time often cover the seeds so deeply as to destroy them, and heavy showers, soon after planting, do some damage by packing the soil. The planting is often rather deep in order to reach moisture, after which, if rain comes, the seeds are too deep to grow well. In some instances the plants fail to get through; in others a shallow cultivation will prevent their being destroyed. Occasionally, during sandstorms, static electricity forms with sufficient strength to injure the plants by burning the leaves. Hail sometimes damages the crop by beating off the leaves. Thus far insects have not been a serious problem. The dry air and abundance of sunshine are unfavorable for the boll weevil, but the leaf worm has given some trouble, being serious enough in a few cases to necessitate spraying. How-

FIGURE 9.—A field of cotton in the Llano Estacado ready to be harvested. The view shows how the plants tend to develop a small amount of foliage, but are well laden with bolls and lint. (Chamber of Commerce, Lubbock.)

ever, since this insect eats the foliage, it is relatively easy to poison.

Numerous efforts have been made to perfect a mechanical cotton harvester to remove the task of picking, but thus far only partial success has been achieved. A machine for this work has been in particular demand in the region; since, under semi-arid conditions and level lands to cultivate, cotton picking requires far more laborers than are needed in growing the crop. The most nearly successful mechanical picker yet used is a "sled" for stripping off the bolls, but this usually is employed only for the last gathering after hand-picking has removed most of the crop. Regardless of the favorable climatic and land conditions for its use, the machine has not been successful.

*The Cotton Section.* The cotton section is more completely dominated by the cotton crop than is the northern section by the wheat crop. This area merges with the wheat lands in the latitude of Plainview on the north and extends southward to the boundary of the region. Unlike the wheat industry in its westward extent, however, cotton growing has not been developed on more than one-half the distance from east to west across the region (Figure 10). Conditions for growing cotton are much more favorable in this section than in the wheat district, since as already noted, lower altitude and lower latitude in the southern part result in a longer and less variable growing season. Although a considerable percentage of the cotton is grown in the dark brown soils, the same general type as in the wheat section, more sand is present than farther north. Furthermore, a large part of the area is covered with the Amarillo sandy loam soils (Figure 4). In general the soils can be worked soon after rains and are especially favorable for the conservation of moisture. Normally the cotton crop

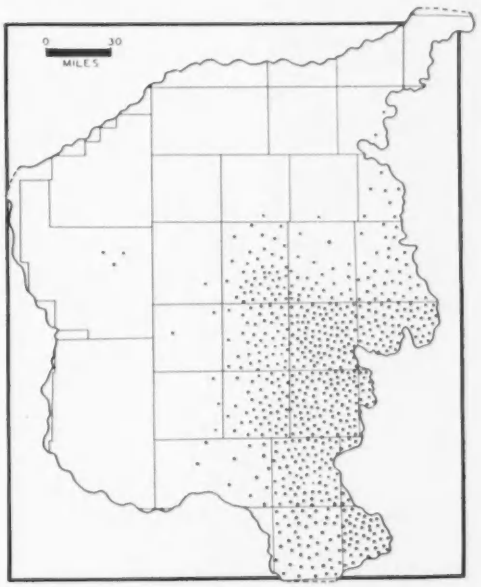



FIGURE 10.—Cotton is to the southeastern part of the Llano Estacado what wheat is to the northeastern part. Each is the chief cash crop of the respective section in which it is grown. The eastern position of the cotton in the region is adjustment to rainfall, while the southern position is related to the length of the growing season (Figures 3 and 8). One dot equals 2,000 acres. (U. S. Census, 1930.)

covers from fifty per cent to seventy per cent of the cultivated acreage in a number of the cotton-producing counties. Six counties of the section—Lubbock, Lynn, Lamb, Crosby, Terry, and Dawson—produced upwards of 100,000 acres each of the crop in 1929. Lubbock County led with 205,276 acres which produced 44,691 bales of lint.

Cotton farming is done on an extensive scale when compared to cotton farming in general over the South. When measured by the size of farms in the Cotton Belt proper, the extensive character is brought out. The average size of farms in five adjacent counties of central Alabama, about the center of the Cotton Belt, are 72.7, 60.6, 72.3, 61.1, and 79.1 acres for Bibb, Chilton, Autauga, Perry, and Shelby counties respectively. Thus, the average for these five counties is 69.1 acres, while the average for the five counties referred to in

the Llano Estacado is 247.2 acres, or more than three times as large as the average size of farms in the counties of Alabama.

The same condition exists concerning the value of farm machinery used. The average value of $491.52 for cotton farms in the Llano Estacado is far greater than the value of machinery on the average farm in the Cotton Belt. Since the gins and compresses usually are the largest buildings of the village, they stand out very conspicuously.

The production of minor crops in the cotton section is not so important as in the wheat section, yet the typical cotton farm produces considerable acreage of these crops. On an average farm cultivated with horses and mules are grown 80 to 90 acres of cotton, 40 to 50 acres

FIGURE 11.—Harvesting grain sorghums with a row binder. Much of the crop is harvested by this method. The combine harvester and thresher is also used extensively, in case weather conditions are favorable and the grain only is desired. These extensive-type machines are quite appropriate for the level, expansive fields. (Courtesy of McCormick Company, Amarillo.)

Again referring to the counties in Alabama, it is seen that the value of farm implements on the average farm is $165.80, or only about one-third that of the farms under discussion. The typical outlay of implements and machinery for equipping farms in the cotton section is about as follows: lister $240, cultivator $178, wagon $125, go-devil $120, total $663. Some use tractors in which cases the cost of equipment is increased by some $1,600, making the total investment approximately $2,000. Many farmers avoid the purchasing of tractors, preferring to use horses and mules.

Throughout the cotton section the cotton gins make up a most conspicuous feature in the town and village phase of the landscape. These structures, unlike some of the grain elevators, are located with respect to urban development, and are rather numerous. In a village of a few hundred people there may be three or four gins and possibly a compress. of grain sorghums (probably including some corn), and about 10 acres of sudan grass for pasturage. If tractors are used, ordinarily the cotton acreage is increased and the amount in feedstuffs reduced, since in this case there is less demand for animal feeds. Other animals, consisting of 3 or 4 cows, 5 to 8 hogs, and 200 chickens are possessed. Some of the farmers sell cream.

### GRAIN SORGHUMS

Unlike wheat or cotton, the grain sorghums are not confined to any particular section of the region. The same soil and temperature conditions that favor the growth of wheat or cotton are suitable for this crop. The drought-resistant character of the plant makes it one of the most dependable crops of the region. Wherever agriculture has been developed, the grain sorghums make up an important part of production. No doubt, for the region as a whole, this is the most valuable crop raised. In 1929

the acreage of the crop amounted to 1,636,015, which surpassed the acreage of wheat or cotton for that year. Only one county of the region raised less than 2,000 acres of grain sorghums for that year, and seven of the counties produced upwards of 100,000 acres each. Most of the counties produced in excess of 50,000 acres each of this crop (Figures 11, 12).

The extensive-type machines are used in breaking the lands, and in planting and cultivating the crop. Most planting is done between May 10 and June 15, with some as late as July 1. However, crops planted as late as the last date may be damaged by frost before maturing in the fall.

The method of harvesting the crop depends much on the weather conditions

FIGURE 12.—Heads of grain sorghum in ricks ready for market. In the dry atmosphere and scant rainfall the grain may remain in this unprotected condition for two or three years without appreciable damage.

Several varieties of the grain sorghums are grown. These include kafir-corn, milo mays, feterita, hegari, and algeria. Sudan grass is a close kin to the sorghums, but is quite different in appearance, resembling a coarse stem grass, while the grain sorghums resemble quite closely the well-known sweet sorghums. The first two (the most extensively grown varieties) are raised chiefly for the grain, but are used also for forage crops. Hegari and feterita are grown mainly for forage, the latter probably being, in some respects, the most preferable of all varieties for this purpose. Algeria has been only recently introduced into the region, hence is not widely grown. Considerable quantities of all these varieties, including sudan grass, are grown for seed, both for supplying markets outside the region and planting in the area.

The methods used in producing the grain sorghums are essentially the same as those employed in growing cotton. and the kind of machinery possessed by the farmer. If dry weather prevails at harvest time, a combine may be used, in which case the grain is cut and threshed in similar manner to wheat. If weather conditions are unfavorable for this activity, the crop is harvested with a row binder and put into shocks (Figure 11), or the heads are removed with a heading machine. On small farms the heads are sometimes cut with knives by hand, and thrown into a wagon, similar to gathering corn. A quite general practice of caring for the grain is that of stacking the heads in long ricks or open pens to await threshing or rise in market prices, or to be fed to livestock in the head (Figure 12). In the dry atmosphere and scant rainfall the grain may remain in this unprotected condition for two or three years without appreciable damage.

The acreage planted in this crop is about equally divided between that grown for grain and that for forage (Figures 13 and 14). As may be seen

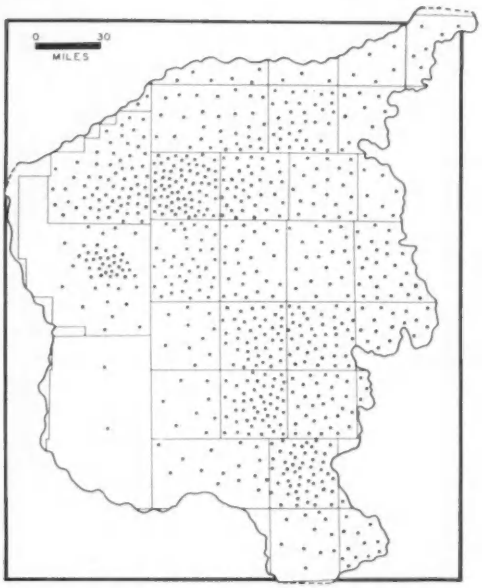



FIGURE 13.—The grain sorghums are the most important crop of the Llano Estacado, if all the region be considered. The drought resistant character of the plant makes it one of the most certain producers known; it is raised wherever lands are cultivated in the area. There is some specialization in the grain as a cash crop in the lands adjacent to the wheat section on the west, and also considerable quantities in the cotton section which, in conjunction with cotton, gives some degree of diversity in commercial crops. One dot equals 1,000 acres.

in the same figures, however, the purpose for which the crop is grown somewhat determines its location in the region. Since a large percentage of the forage is consumed by horses and mules and dairy cattle, there is quite close relationship between the distribution of these animals and that part of the crop grown for forage. Thus, the crop raised for this purpose is most common in the southeastern part of the region where feeding of farm animals is done most extensively. On the other hand, the grain production is centered in the western portion of the wheat and cotton sections, since wheat and cotton are the preferred cash crops in the rainier eastern parts.

It has long been known that the food values of the grain sorghums are relatively high. In recent experimental feeding more definite information has been acquired by analyzing different varieties, the food values of which are found to rank well in comparison with corn. For instance, the food value for feeding swine is found to equal 92 to 98 per cent of that of corn.

### OTHER CROPS OF THE REGION

A number of crops of minor importance are grown in the region. Besides the oats, barley, and rye, referred to in discussing the wheat section, corn, sudan grass, vegetables, and fruits are grown to some extent almost everywhere that agriculture is developed. Although corn is grown in all parts of the region, there is some concentration of the crop in the south-central and northwestern parts (Figure 15). More than 30,000 acres of corn were raised in each of the four leading counties of these areas in 1929, and more than 1,000 acres were grown in practically every county represented in the region. The planting and cultivation of the corn are carried on quite like that of the grain sorghums, and the crops are raised for the same purposes, the corn also being grown both for the grain and for forage. A variety of corn called Mexican June corn, has been found to grow well in the semi-arid climate. In certain sandy soils in the western part of the region this crop is produced more successfully than are the grain sorghums.

The sudan grass is grown chiefly for grazing. As the native grasses are destroyed, the demand for other sources of pasturage increases, and sudan grass has been found quite appropriate for this use. Like the grain sorghums, the plant withstands well the semi-arid conditions, and it continues growing from planting time in the spring until killed by frost in the fall. The crop is common in all parts of the region where agriculture is carried on, but is most exten-

sively grown in the eastern part where natural pasturage is scantest. Since sudan grass is an annual, large quantities of the seed are required each year for planting. Certain sections, as about Sudan, Muleshoe, and Littlefield, have become rather specialized in seed production.

Vegetables for home use are grown on almost all farms, but production for commercial purposes is not great. The semi-arid climatic conditions do not favor the growth of vegetables, and readily accessible markets are not sufficient to demand large quantities of them. A large percentage of the producers, both for home use and for the market, rely in part on irrigation. The home gardens are irrigated from wells that are pumped by windmills primarily for domestic use. Most of the commercial crop is grown near the larger urban centers, and is marketed in those respective places, although a few localities, notably Portales, produces for markets slightly more removed (Figure 16). The vegetables raised in the region, including most common varieties, are not sufficient in quantity for local demands during the season of production. A small amount of commercial canning is done, especially of tomatoes.

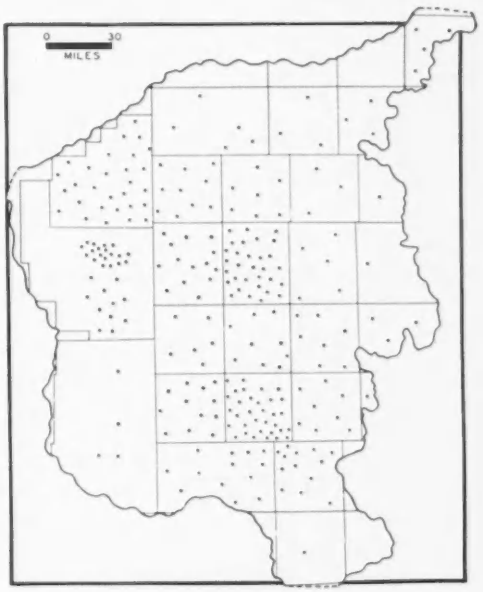



FIGURE 15.—Corn is a crop of only moderate importance in the Llano Estacado. Most varieties do not withstand well the dry weather of the average summer, however a few varieties grow surprisingly well in the sandy soils of the central and western parts of the region. One dot equals 1,000 acres.

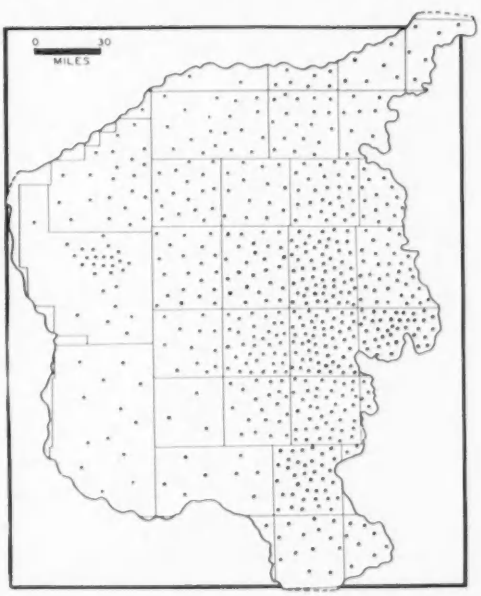



FIGURE 14.—The grain sorghums that are grown for forage are also well distributed over the region. With the destruction of the natural pasturage comes greater demand for produced feedstuffs. This is particularly true in the cotton section where numerous horses and mules are used as draft animals—hence the concentration of this crop in the section where cotton is most extensively grown. The small area of considerable production in the western part of the region is in the irrigated district about Portales, New Mexico. One dot equals 1,000 acres.

The fruit crop is similar to vegetables in that it is quite generally distributed over the region. Like vegetable growing, also, the total production is not great. The climatic conditions that produce the Norther ordinarily result in bringing late spring breezes that destroy the fruits after growth has begun. On the average a crop is produced every six or seven years. A typical farm orchard covers less than one-half acre, but includes a variety of trees, as apple, peach, pear, plum, cherry, apricot, and

grape vines. Due to the uncertainty of the crop and the special care required to keep the trees, there has been no effort to produce fruits on a commercial scale. The city markets depend almost entirely on outside sources for these products.

Small quantities of broom-corn, watermelons, peanuts, and alfalfa are grown. Since broom-corn will produce on considerably less moisture than is required by the grain sorghums practically all the crop is grown in the drier western part. Watermelons are grown in commercial quantities in a few counties, largely on the sandy soils. When ready to market, the melons are hauled by trucks to the larger centers for sale. Peanuts are rather generally grown in the southern half of the region, but nowhere is the acreage large. The plant withstands the semi-arid conditions comparatively well, and is adapted to the sandy soils, but the crop does not fit well into the extensive farm methods in vogue. Alfalfa is an important crop in the irrigated districts, but very little is grown elsewhere even though deep rooting is a particular characteristic of the plant. The limey, prairie soils, as a rule, are excellent for this growth when moisture is sufficient, and by supplementing the natural water supply through irrigation, heavy yields are produced. The crop is being steadily increased. Sweet potatoes are grown in a few localities, but, like alfalfa, the crop is largely confined to the irrigated lands, particularly the Portales project. Nowhere in the region are the hay crops, other than alfalfa, produced in large quantities. Where natural grasses are plentiful, there is little demand for hay, since the pasturage can be used all of the year; and where the cultivated crops are depended upon, the drought-resistant grain sorghums and sudan grass are more certain and more productive than are the hay crops.

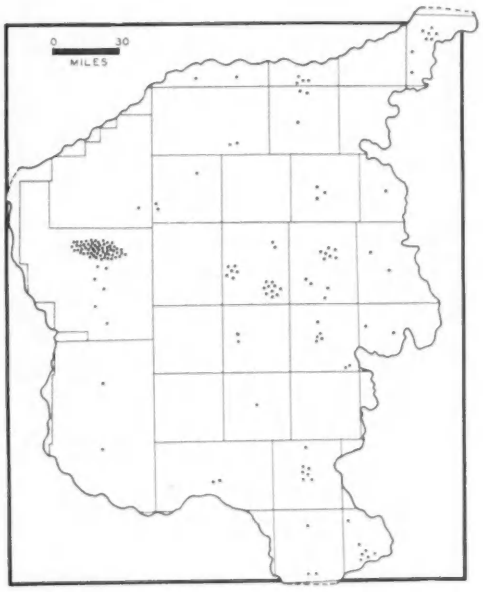



FIGURE 16.—Vegetables for home use are produced quite generally over the region, but those grown for the market are limited in quantity and are practically confined to lands adjacent to the towns in which they are marketed. The one particular exception is the Portales district from which considerable quantities are marketed as far away as Amarillo and Lubbock. One dot equals 10 acres.

### DRY FARMING

A small amount of dry-farming is practised in the region. Thus far, however, this type of farming, in the usual meaning, has not been developed into a system. It is quite evident that the dry-farming practices employed in the region are rather generally overrated by the people not acquainted with the situation. Before visiting the region the writer had heard more about dry-farming there than could be heard of or detected during approximately four months stay in the region. A few farmers practise a three-year program of dry-farming and some follow a four-year plan, but these make up a small minority of the farm element. A few others are spasmodic in these practices. Summer fallowing is more common in the wheat section than in any other part

of the region. In that area a small percentage of the farmers leave uncropped about one-third of their cultivated land, which is plowed during the summer about as often as the weeds begin to take appreciable quantities of moisture from the soil. Sometimes it also is necessary to cultivate the fallow lands in the winter season to destroy winter grass, and in some cases, Johnson grass. Thus far, the results obtained from these practices favor a regular program of dry-farming, particularly in the wheat section. From the information available it is believed that alternate-year fallowing would increase the average yield of wheat by one-third to two-fifths of the present production.

If a differentiation between the terms "dry-farming" and "dry-land-farming" were acceptable, the latter would more nearly designate the agricultural program of the region. The crops grown are selected from those that are adapted to semi-arid lands, and the methods of planting and cultivation conform to a moisture-preserving practice rather than to a moisture-storing program, as is more often inferred in dry-farming.

## IRRIGATION

Irrigation is being developed as a phase of the general effort to cope with the semi-arid conditions. A number of "shallow water" districts exist in the region from which large quantities of water can be pumped at relatively low cost.

According to *The Geology and Water Resources of Eastern Panhandle of Texas*, by Charles M. Gould, in the process of formation the materials of the land were promiscuously distributed by the shifting stream channels, resulting in varied textures through the deposits. These variations have direct relationship to the underground water supplies. Where beds of coarse materials (sand, gravels, etc.) occur somewhat enclosed by more impervious clays, the water is likely to be plentiful, and wells drilled into these deposits usually supply large quantities of water.

The water supply, apparently, is entirely from local rainfall. This condition precludes three opinions rather generally held by the people of the region: first, that ground waters lead in from the Rocky Mountains or other portions

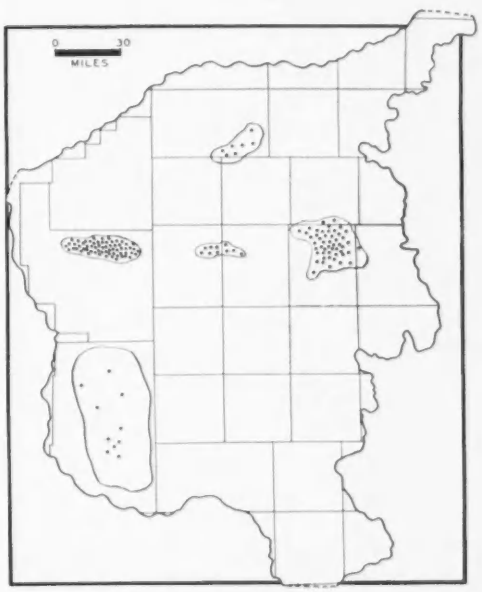



FIGURE 17.—A number of "shallow water belts" are present in the Llano Estacado from which water can be pumped at relatively low cost. Irrigation, as a means of coping with the semi-arid conditions, has been extended rather rapidly during the last decade. The level to rolling lands and fertile soils are very favorable to this enterprise, as is indicated by the heavy yields of the crops grown on the projects. One dot equals 5 wells.

of the High Plains; second, the belief that artesian water may be obtained from some strata; and third, that irrigation waters could be produced in unfailing quantities. The water is almost, or entirely, free from minerals that are injurious to plants, and the level to undulating topography and fertile, friable soils are excellent for utilizing irrigation waters. Development of irrigation was begun in the first decade of the present

century, and has been steadily increased. A number of projects of local importance have been developed (Figure 17). Practically all the irrigation carried on in the region, except that of home gardens, is confined to these districts.

The Portales "Valley" is the leading irrigation district of the region. By 1935 some 350 wells were being operated regularly. This area has the appearance of an oasis or an island in the landscape, in so far as human activity and general appearance are concerned. It is a well-developed and highly diversified agricultural section. A sharp contrast is offered between the adjacent, and more often brownish, grasslands and the valley of green fields, numerous trees, and fairly dense population. Of the 11,109 population of Roosevelt County 4,888 are in Portales Township, and most of these are in the irrigated area, of less than 100 square miles.

The other irrigation projects are not so conspicuous in the landscape as that of Portales. On all of the areas, however, production is more diversified than over the region in general. In addition to wheat, cotton, and grain sorghums, the chief crops of the region, potatoes, alfalfa, sweet potatoes, melons, tomatoes, beans, onions, and other vegetables are grown. On a number of the projects some degree of specialization in particular crops has been developed. This may be noted in the production of sweet potatoes at Portales, potatoes at Hereford, and potatoes and alfalfa at Plainview. Nevertheless, in all irrigated areas considerable variety in production is the rule.

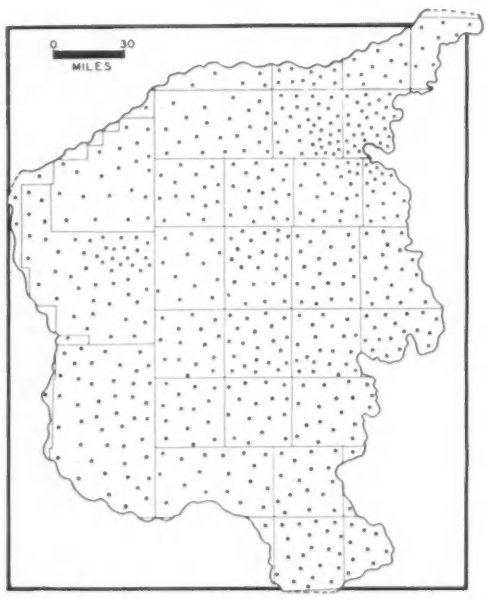



FIGURE 18.—Although diversity in production in the Llano Estacado has caused lessened interest in the cattle industry, these animals are as numerous in the region as during the days of the "Cattle Kingdom". The native grasses still are an important factor in the industry, particularly in the western part of the area where little land has been plowed, but chief reliance is placed on produced feeds. One dot equals 1000 head of cattle.

## THE LIVESTOCK INDUSTRY

Present conditions of the livestock industry show diversity similar to that among other phases of development. As previously stated, the Llano Estacado is no longer primarily devoted to cattle raising. Not only have livestock in general become of secondary importance, but cattle have come to make up only a part of the somewhat generalized livestock industry. Although cattle continue to be most numerous of the livestock, horses and mules, sheep, and hogs now occupy important places in this phase of regional production. Of the 1,718,917 animals in the region in 1929, cattle numbered 582,718, sheep 284,134, horses and mules 154,822, and hogs 133,530. To the above list might be added poultry which numbered about 2,117,000, largely chickens, but a considerable number of turkeys.

According to numbers of animals produced, the livestock industry of today attracts relatively little attention, if compared to that accorded the industry of the pastoral period. Taking ten coun-

ties well distributed over the region as representative, the Census Reports of 1930 show more cattle than in 1900, when the cattle industry flourished. This is not an unusual condition, however. Sparsely settled territory, as to area, rarely rivals well-developed lands in amount of production. It is more often the specialization and methods of production that attract attention rather than actual quantities produced.

At the same date ten counties selected at random in central Iowa possessed about four times as many farm animals as did the counties referred to in the Llano Estacado. But the counties in Iowa are only about one-half as large, making the animals eight times as numerous according to area. Also it is found that cattle were about four times as numerous in the counties of Iowa in 1930, according to area, as were these animals in the Llano Estacado in 1900, about the height of the pastoral industry there.

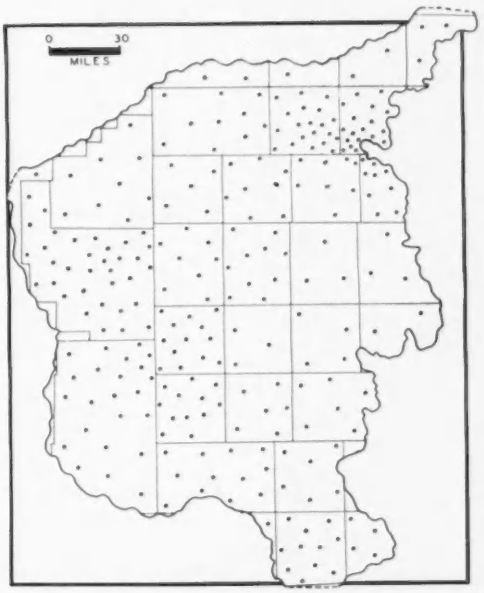



FIGURE 19.—Beef production continues to be an important industry of the Llano Estacado. The greater numbers of these animals in the western part of the region is closely related to extensive natural grasslands in that part. The conspicuous numbers in the northeastern part of the area are produced on the broken lands about Palo Duro Canyon where little of the land is under cultivation. One dot equals 500 beef animals.

The livestock industry as a whole, similar to economic development in general, is most extensively developed in the rainier eastern part of the region. Although a larger percentage of the lands in the western portion is utilized for the livestock industry than is true of those farther east, the greater productivity of the eastern lands provides maintenance for more animals. Though the natural pasturage is relatively scarce in the eastern part, the more extensive use of sudan grass for grazing and the greater amount of feeding done here tend to counteract the greater range opportunities of the lands farther west. The easterner, accustomed to the more palatable appearing grasses of the humid lands, marvels at the fat, sleek cattle feeding on pasturage, that, at best, looks uninviting for animals; and in extreme cases is dry enough to burn, if the quantity left on the ground is sufficient to carry fire. Furthermore there is considerable movement of animals from the grasslands of the western part into the eastern grain-producing portion for a short period of feeding before final marketing. This practice further tends to maintain an even distribution (Figure 18).

If the livestock are considered separately, definite adjustments are brought out. The beef animals, in general, are more numerous in the western portion of the region where grasslands are plentiful and which is more removed from markets (Figure 19). The one exception is the concentration of these animals in the northeastern part in the broken lands about Palo Duro Canyon. The dairy industry, on the other hand, is more extensively developed in the eastern portion where agricultural production is more diversified and markets more convenient. An exception in this

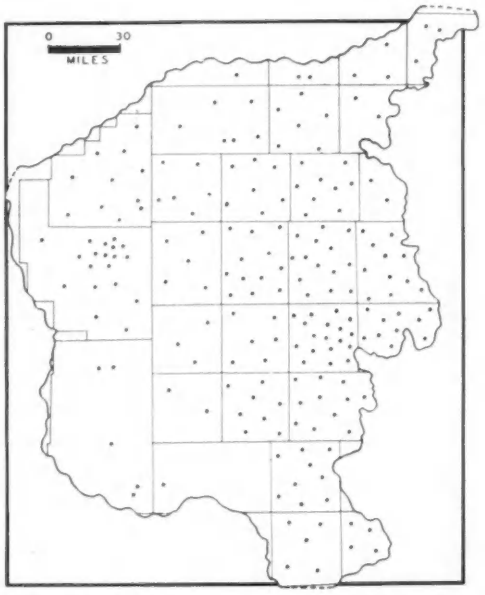



FIGURE 20.—The dairy industry has become rather important in the eastern part of the Llano Estacado, where most of the cities and larger towns of the region provide considerable markets for the products. Also, the grain sorghums, cotton seed, and by-products of the flour mills supply an abundance of concentrated feeds for the animals. A rather large amount of the dairy products are shipped to markets outside the region. One dot equals 500 dairy animals.

case is the development of dairying in the irrigated district about Portales (Figure 20). Most of the dairy animals are kept on farms as a part of the farm economy, although a number of herds are present about the larger urban centers, where there is special demand for fresh dairy products. Sheep raising has never been of great importance in the region. Though raised chiefly for wool, the clip of 1930 was slightly below 1,500,000 pounds. This scant development of the sheep industry appears unnatural from the climatic standpoint, since these animals tend to be raised in semi-arid lands. But, conversely, there is similar tendency as to the use of level lands for cattle raising; therefore, when both factors are considered, the development is fairly typical. Also the concentration of the industry in the drier southwestern part is quite observable, and over the region in general the sheep are largely confined to the sloping and broken lands about the draws, ravines, and canyons. Thus far little interest has been shown in raising hogs. Until recently little opportunity existed for raising animals that require a great amount of concentrated feeds, and the "carry over" from early time of the interest in cattle doubtless has been against producing other animals. However, with the extensive growth of grain sorghums, and the discovery that this grain is excellent for raising and fattening livestock, greater interest is being manifested in hogs. In 1930 there were some 135,000 in the region. Yet complete advantage of the opportunity that exists for raising this animal has never been taken. At present the industry is well distributed over the area. Horses and mules compare favorably in numbers with other animals, except cattle (Figure 21). Since crop production has become important in the region, there is special demand for these animals for draft purposes. As would be expected the distribution of the animals corresponds closely to that of agricultural crops in general. There is slight exception to this, however, since considerable numbers of horses are kept for riding purposes, and the extensive use of power-driven machinery in the wheat section leaves less demand for work animals in that part. Thus it is in the cotton section that both horses and mules are most numerous, where the farms are relatively small and agricultural production slightly more intensive than elsewhere over the region.

## SUMMARY

The farming industry now holds preeminence among human activities in the Llano Estacado. In this program the specialization of early time has been displaced by considerable diversity, al-

though certain phases of specialized production still exist. The distance out to the great markets sets limitations on the type of products shipped, even though excellent transportation facilities have been provided. The scant rainfall still further lessens the opportunity for variety in production. The dominance of wheat, cotton, and grain sorghums among the crops is a sort of specialization, as well as an adjustment to the position with respect to markets, the semiarid climate, and conditions of soil and topography.

Although the rainfall is scant, the abovementioned crops are rather certain in production. The winter variety of wheat matures in early summer ordinarily before dry weather becomes severe. Cotton withstands the semiarid climate very well and is even better adapted to the long hauls out to market than is wheat. The grain sorghums lead the other major crops in being drought resistant. Also, they have been found quite satisfactory feeds for livestock and poultry. These grains supplemented by cotton-seed products and the by-products of the flour mills, have become the accepted concentrates for feeding purposes.

Much opportunity exists for agricultural expansion in the region. Except in a few small sections practically all the land is cultivable, yet nowhere over large areas does the cultivated land reach seventy per cent of the total. In the northern part of the region much territory is available for increasing the wheat acreage, a considerable portion of which is made up of new lands of excellent fertility. The cotton crop can be expanded to similar extent in the southern part of the region. The leading cotton-producing counties are not thoroughly utilized, and a large part of the untilled lands of the region lies west of the cotton section, on which cotton will grow. Since the grain sorghums will produce in all parts, there is greater opportunity for increasing this crop than for either wheat or cotton. The broomcorn crop, being even more drought resistant than the grain sorghums, may receive more attention in the drier western part. Production may also be extended through further promotion of dry-farming and irrigation.

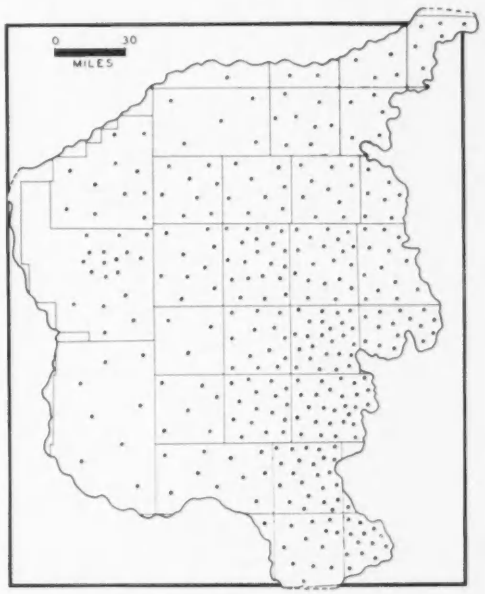



FIGURE 21.—Horses and mules are used extensively in the region for farming purposes, particularly in the eastern part where much of the land is cultivated. A great deal of power-driven machinery is used in the wheat section, hence fewer of these animals are present in that part than in the cotton section of the region where such machinery is not so widely used. One dot equals 250 animals.

The livestock industry, if considered as a whole, is of more importance than in the days of the "Cattle Kingdom," but with the development of generalized agriculture has come less conspicuous methods of animal production. Although much of the natural pasturage, especially in the rainier eastern part of the region, has been destroyed, a greater supply of feedstuffs is obtained from the crops grown than was previously available. This, in conjunction with

considerable urban markets, has been conducive to the recently developed dairy industry. Sheep are raised in moderate numbers, particularly in the drier western portion of the region and on the slightly broken lands over the area in general. With the production of concentrated feeds has come some interest in swine raising, with promise of more attention to that animal. Horses and mules are fairly numerous, particularly in the rainier eastern part of the region where these animals are used for farming purposes.

# SEAMLESS HOSIERY INDUSTRY OF LACONIA, NEW HAMPSHIRE

*J. Norman Carls*

THE hosiery mills of New Hampshire, during the decade 1909–1919, employed slightly over 3,000 wage earners; today the figure stands at 1,200. Though a small industry at its war-time peak, it is one of much importance to the Yankee and French-Canadian inhabitants of two attractive and once prosperous White Mountain towns. This study, however, carries broader significance: It affords insight into several aspects of industrial problems characteristic of New England.

Laconia, city of 12,500 on the cascades of Winnipesaukee River, outlet of the island-studded tourist magnet of the White Mountain area, Lake Winnipesaukee, has felt keenly the loss of industry. One of its eight hosiery mills closed in 1923, a second in 1928, three more in 1931 and 1932. Only three remain in operation. At Franklin, fifteen miles downstream from Laconia in the upper Merrimack Valley, vigorous management maintains production in the single mill, the largest in the state. Neighboring villages of Hillsboro, Tilton and Belmont contain small plants closed within the last decade. Are those New England industrialists correct who declare, "The South has us whipped"?

## The Beginnings of Hosiery Manufacturing at Laconia

A ten-foot fall in the small but lake-regulated Winnipesaukee River determined the site of Laconia. Following nearly a century-long pioneer period of village growth rooted largely in community type industrial development, but with a few enterprises in cotton or woolen textile manufacture, the first hosiery mill opened in 1847. The industry flourished and, with the addition of a new mill under separate management every five or ten years for several decades, became one of the two dominant economic interests of Laconia. Car manufacture, from soon after its inception in 1850, constituted the leading industry of the city until about the turn of the century. The car shop activity declined with decreasing significance of lumber as a raw material and abatement of street car service in New England cities. The shops closed in the late twenties.

The hosiery industry attracted satellites. Almost since the opening of the first mill one or two small needle manufacturing plants, supplying the most readily replaceable item of knitting equipment, have operated in Laconia. The manufacture of knitting machines began during the eighties and has mounted in significance. One of the two large American makers of seamless hosiery knitting machines manufactures solely in this New Hampshire hosiery capital. The competitor of the Laconia seamless hosiery knitting machine company manufactures in Pawtucket, R. I. Machines for knitting full-fashioned hosiery are made in the center of full-fashioned hosiery production, Reading, Pennsylvania.

## Immediate Causes for Mill Closures

The hosiery manufacturing companies of New Hampshire are essentially family organizations. Although control of certain of the mills has shifted from the family of the founder, it re-

mains more common to find sons and grandsons of the founder managing the mill he established. In the twenties a Laconia plant closed because of the death of the last member of the oldest "hosiery family" of the town, owner of the plant. A second mill closed when the aging owner, one of the pioneers in American hosiery manufacture, with one son lost in the war and the second, phenomenally, a renegade from the hosiery industry, read in the trend toward fancy-patterned hose a decline in manufacturers' profits. He read rightly, —but with a son in the mill the reaction might have been different. The advent of fancy hose brought lowered profits to manufacturers by necessitating frequent machine adjustments for new patterns and through reduced size of individual orders resulting from fear of style change.

Family relations, however, can neither explain nor help to explain other closures. At least two of the mills of the Laconia area discontinued operation largely because their products had become outmoded and machines or management or both lacked adaptability. One of these produced women's heavy stockings. In wide demand during the early years of the short skirt period, this type of hose, except for cotton field and Arctic summer wear, steadily lost its consumer appeal. A second mill manufactured the once popular "Contoocook" hose, a men's heavy half-hose made of mixed cotton and wool (mostly cotton) that traditionally retails for twenty-five cents a pair. In response to more sheltered working conditions, numbers of workmen now wear lighter weight hose. Besides, during periods of high-priced cotton a hose that "has always been a quarter" yields extremely close profits.

Others of the Laconia mills now idle attempted to adjust their lines of output to the trends in demand. For several years they faced financial losses, then closed. When asked to explain this action the answer comes, "The South has us whipped."

FIGURE 1.—An obsolescent, abandoned hosiery mill of the New Hampshire area.

### TYPES OF HOSIERY PRODUCED IN LACONIA

Laconia mills produce only seamless hosiery. The principal line of output of one of the three mills now operating is a medium-weight (two pounds per dozen) all-wool, striped, three-colored sports hose. Other lines include a medium weight all-cotton sports hose and a medium weight merino (80 per cent cotton and 20 per cent wool) men's half-hose.

### COMPETITORS

The conditions and prospects for any definite economic endeavor within a region or city can be fully understood only by taking cognizance of the conditions and prospects of the competitors. In this study only the leading districts of domestic competition are considered, and the bases of Laconia for the manufacture of various types of men's seamless hosiery are compared to conditions (1) in the Reading, Pennsylvania area, (2) in the Chattanooga area of western Tennessee and northern Georgia, and (3) in the High Point-Burlington area of North Carolina. These rank as the three leading hosiery manufacturing sections of the United States: the two southern districts have provided the most disastrous competition to New Hampshire hosiery manufacture and constitute at present its principal threat. Lines of output differ between these three districts and within each of them.

Of the seamless half-hose produced in Reading approximately 95 per cent is "ingrained,"—that is, knit with colored yarn rather than knit plain and then "dip-dyed." This is because southern manufacturers make little "ingrained" hosiery and proximity to full-fashioned manufacture, Reading being the nation's full-fashioned hosiery center, tends to force upward the wages for seamless production and to decrease the wage differential between plain and ingrained work. The first consideration is by far the more important.

Not more than 10 per cent of the seamless hosiery produced in Reading is part wool; only a very small percentage is all wool. Demand dictating, the work in wool becomes here a strictly seasonal proposition—April to October.

The mills of Tennessee and Georgia make a great variety of hosiery, from infants' and children's anklets to ladies' silk full-fashioned. Fancy seamless half-hose remains the leading line but has declined in importance owing to North Carolina competition. This older of the southern hosiery sections, where some mills have operated since the nineties, has felt, like New England and Pennsylvania, the blighting competition of the new mills of North Carolina.

Considerable variety in kinds of fancy half-hose prevails throughout the Chattanooga district. One mill makes prin-

FIGURE 2.—These factories along the small Winnipesaukee River at Laconia, New Hampshire, with but one exception, still operate on direct water power.

cipally ingrained hose; a few knit smaller quantities in color. Many, however, lack winding departments and proper dying facilities for ingrained work. This section works small but increasing quantities of wool.

The North Carolina manufacturers with few exceptions produce low-grade fancy half-hose, mostly of cotton and rayon. They use practically no wool and do practically no ingrained knitting. Operating with all or nearly all automatic machines, most of the mills of the High Point-Burlington area cater to the large market for cheap hosiery and have been able, during the last decade, to largely capture this market from mills of other regions.

In 1925 Pennsylvania hosiery mills (full-fashioned and seamless) employed 40,000 operatives, Tennessee mills 12,000, and North Carolina mills 12,000 operatives; in 1931 Pennsylvania mills

still employed approximately 40,000 workers and Tennessee operatives continued to number about 12,000, while North Carolina hosiery mill employment has mounted to 20,000. New Hampshire hosiery mill employment during that period dropped from 2,100 to 970 operatives.

FIGURE 3.—This view of the power dam at Laconia, New Hampshire, intimates the venerable age of the mills that line the small power canals it feeds, and reflects the formerly disastrous effects of southern competition.

## COMPARISON OF THE BASES OF PRODUCTION

Of the total cost of manufacture of seamless half-hose, the combined cost items of raw materials and labor amount to from 80 to 90 per cent. For most lines, raw materials cost slightly more than labor.

Few hosiery mills spin the yarn consumed. Purchased yarn comprises the most significant raw material item. New England mills as well as the southern mills obtain cotton yarns principally from the Carolina piedmont. Most rayon and silk comes from New Jersey or New York. The wool yarns used in minor quantities move largely from centers in southern New England, principally from mills of the Blackstone Valley. Small quantities of wool yarns however—sufficient for certain southern hosiery mills—can be obtained from southern plants. One Laconia company, purchasing scoured wool from suburbs of Boston (the leading American wool market) and cotton "peelers" from New England textile centers, spins much of the yarn it consumes. All establishments knitting part-wool hose obtain "merino" and "worsted" yarns from New England.

Laconia lies nearer the principal sources of wool and farther from cotton than most of its competitors. In hosiery manufacture, however, the slight differences in textile material cost prove an extremely minor factor in favoring one region over another. For the various yarns and fibers used in Laconia the transportation expense averages only 2 per cent of the total cost. The most favored location could not lower this cost item greatly.

Paper boxes, the only raw material the cost of which differs markedly from region to region, account for from 2.5 to 4 per cent of the total cost of hosiery production. For this item Laconia manufacturers pay from 25 to 66 per cent more than their leading competitors.

The majority of the operatives in Laconia Mills are of French-Canadian descent. The strong family ties of these people make them fully as immobile as much of the Yankee stock of New Hampshire. Mountain scenery, the lakes, and winter sports lend charm to life in this recreational heart of New England, and help to hold desirable families for employment in the machine factory and in the hosiery mills. Many have invested in homes. The presence of the machine factory helps the hosiery mills by providing "parasitic labor" (wives and daughters of the machine factory employees) to work in the hosiery mills. The especially acute local economic depression has resulted in no exodus of workers. Though aggravating the relief situation, this condition strengthens the industrial promise. No labor union functions in this comparatively remote and stolid community; no threat of serious employer-operative

difficulty has disturbed the locality since the period of war-time expansion.

Labor conditions in southern hosiery mill towns vary. Most workers are descendants of early British settlers of the southern Appalachian Mountains, valley and piedmont. As was true of the southern cotton piece goods industry, the southern hosiery industry paid, in general, astonishingly low wages before N.R.A. Pay for knitters varied from six dollars to about twelve dollars per week; mills in rural communities, generally having no competition, and drawing, as now, the least efficient workers, paid rock-bottom wages. In addition, the hours of labor exceeded those permitted by law in the North.

The Hosiery Code of the N.R.A., setting minimum wages of thirteen dollars per week in the North and twelve dollars in the South, and establishing uniform work hour regulations, altered the relative outlook of the two sections. Perhaps the principal lasting effect of the N.R.A. on the hosiery industry was in making the southern operatives wage conscious. The materially increased wages established for the section remain, for most part, in effect. Labor strike reports in the daily newspapers attest to what happens when manufacturers attempt to revert to pre-New Deal rates. Only in exceptional cases, and these principally in isolated communities, has reduced pay followed the unfavorable Supreme Court decision on the N.R.A. and the relinquishment of the Hosiery Code Authority.

In all cases the southern mills succeeding in reducing wages have been those producing inferior merchandise. A study of comparable knitting piece rates now paid in Laconia, in the Chattanooga area, and in North Carolina centers reveals no significant labor cost differential between North and South.

Sharing ownership and use of water rights, all except one of the Laconia hosiery mills operate largely on direct water power. One generates its own hydroelectricity. For the purchased electric power used most widely in the industry, rates on the quantities used in an average mill run from 20 to 33 per cent lower in the South than in New England. In all cases, however, power is an unimportant cost item.

Coal for heating, amounting to as much as 2 per cent of the total cost of production, is obtainable in southern centers for from 75 to 25 per cent of the cost in Laconia. Sites nearest the Appalachian coal fields enjoy the greatest advantage.

Tax rates in general vary in accordance with the size of the towns. Mills in rural districts of the South have lowest tax rates. On the other hand, mills

FIGURE 4.—Less picturesque than its New England competitors, but more business-like in appearance and in actuality, is this hosiery plant near Chattanooga, Tennessee.

of certain southern centers are assessed more heavily than are those of New England.

In transportation costs to the leading American hosiery markets the New England mills can boast a slight advantage. In another regard, however, relative proximity to New York City constitutes a much more significant advantage: It facilitates frequent personal contact between producers and hosiery factors and wholesalers. Particularly in the Chattanooga district, most remote

FIGURE 5.—Most southern mills achieve both practicality and pleasing appearance.

of these leading hosiery producing regions from New York, mill officials recognize and acknowledge the "damper" that their location holds over their salesmanship.

A long-established reputation for quality production increases the New England marketing advantage. This, of course, benefits the manufacturers only when knitting goods for the limited high quality trade.

In comparing the bases of production of Laconia and competing districts we have found only minor and readily surmountable advantages inherent in the respective sites. The complicated, interrelated factors of efficiency of plant and machinery and managerial attitude and ability remain to be considered.

The total burden or overhead, including all expenses which must be met when mills operate but which do not vary in proportion with the volume of output, amounts to about 25 per cent of the total cost of hosiery production. Approximately one-third of the labor cost must be included under this heading, as must taxes, coal, insurance, salaries, and many miscellaneous expenses.

Laconia mill buildings are old and unquestionably inferior to most southern mills in regard to construction for efficiency. Some of the machines in certain of the Laconia mills are equal in quality to the non-automatic machines used elsewhere. In general, however, obsolescence characterizes both the plants and equipment of the New Hampshire hosiery center.

The early labor cost advantage of the South was overwhelming; it hit New England hard. Then came phenomenal changes in hosiery styles, and rarely does a long-established manufacturing region adapt itself to new conditions without breaking stride. Reinforced by the general economic depression, these factors of labor cost disadvantage and style changes thoroughly imbued many New England manufacturers with a defeatist attitude.

## SUMMARY OF CONCLUSIONS

There is inherent in the Laconia site neither major advantage nor impressive handicap for hosiery manufacturing. In the two large cost items of raw materials and labor it stands on a near par with American competitors. The New Hampshire center, however, lacks huge plants and automatic machinery. For that reason it must, in-so-far as market demand does not permit expansion of plants and equipment, produce the higher quality and more specialized lines of hosiery.

Twin advantages of Lanconia that encourage industrial revival are (1) its relative proximity to the New York City marketing center, a position permitting frequent personal contacts with factors and wholesalers, and (2) an undimmed reputation for high quality goods.

Its principal handicaps are (1) the inefficiency of plants and equipment that commonly characterize old industrial regions and (2) a defeatist attitude—an attitude developed during that period when southern competing centers enjoyed decided labor cost advantages, and aggravated by style changes perplexing to long-established industrial centers, and by the recent general economic depression. As neither of these handicaps are inherent in the *site,* neither are unsurmountable.

# WACHUSETT RESERVOIR, A METROPOLITAN WATER SUPPLY

*Minnie E. Lemaire*

AVAILABLE potable water supply determines, in the final analysis, the location of a people and the future growth of a community. Boston, Massachusetts, as the focal point of a rich hinterland, grew very rapidly from a small fishing and shipping port to a large urban center. Early in the city's growth the local water sources had been taxed to their fullest capacity. The increase of population continued until the consequent demand for water exceeded the local supply. Population pressure combined with a large amount of ready capital enabled the city to push out beyond its own borders to obtain water from adjacent regions. Many suburban residents resented being compelled to relinquish their property for public use in another area. However, the city did not halt in its efforts and, under pressure, continued to extend its rights ten and twenty miles distant, often at the expense of the small towns. By 1895 Boston, constantly forced outward, reached thirty miles westward and acquired property in the valley area of Boylston and West Boylston.

FIGURE 1.—Overlooking the Wachusett Valley in West Boylston, the fairways of a golf course in the foreground, Boylston in the middle distance, and Wachusett Reservoir to the left in the background.

Although the large valley (Figure 1), suitable for a reservoir site, owes its present morphology to glacial action, its history dates back to the early Tertiary period. At that time two streams flowed in channels toward the south but as these small streams could not maintain their flow in this direction, they were captured and diverted into a large and powerful river, the Nashua River, which had worked its way back from the northeast. The river continued to receive more and more tributaries, and, as a result, gradually cut a rather large sized valley. Thus, when the glacial period began, a valley already existed.

The present land form and surface features indicate considerable modification by glaciation. As the glacier retreated from this region after extending as far south as Long Island, it left débris in the old south flowing stream channels and closed them to any glacial streams which might enter them from the valley

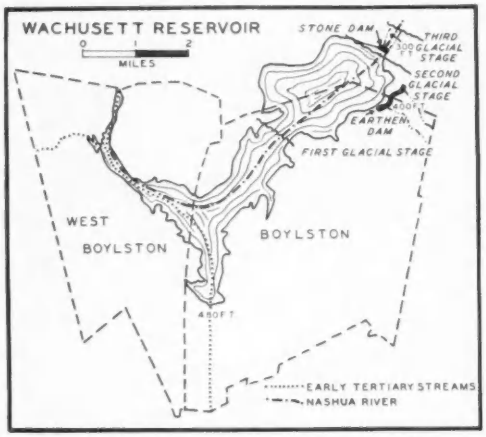



FIGURE 2.—Wachusett Basin region, indicating the ice barriers which impounded the melting waters at several stages of the glacial retreat.

at an elevation of less than 480 feet (Figure 2). The glacier, after leaving the south portion of the valley, stopped for a period a few miles to the north in such a manner that it blocked the natural outflow path of the Tertiary Nashua River. With all outlets blocked and water draining into the basin, a temporary glacial lake formed. The resultant sand and gravel terraces, about 460 feet in elevation, stand out conspicuously in the landscape today. Later with the recession of the glacier a rather momentous change took place. A channel was opened at an elevation of 400 feet; the water level of the lake, as a result, dropped rapidly and remained at this level sufficiently long for another stage of sand and gravel terraces to develop, which today mark the high water level of the reservoir. In time the glacier retreated from this vicinity and opened the river channel northward. The large body of water in the lake quickly escaped and only the narrow south branch of the Nashua River occupied the large valley. Physiographically this last stage represents the condition when it was first considered a possible reservoir site.

The conversion of a natural valley into a water supply basin depended not only upon the configuration of the lowland but also upon the contributing volume of a number of tributary streams sufficient to provide a constant source of water. Two large streams (Figure 3) and numerous small brooks, with a fairly even flow, constituted sufficient drainage to furnish an adequate amount of water to fill a reservoir, if constructed.

Configuration of the land does not, in itself, assure a good reservoir. Of utmost importance is an adequate and dependable water supply which, in turn, depends upon soils, vegetative covering, and climate. In this area the annual precipitation averages 45 inches and is evenly distributed throughout the year. In general 3 inches or more falls during every month of the year. Cyclonic storms cause practically all of the winter precipitation and some of the summer rain, while convectional disturbances of the thunderstorm type account for a rather heavy summer rainfall. The winter precipitation often comes in the form of snow which remains on the ground for a considerable length of time, generally providing an even flow of water during the early part of the year when it begins to melt. One unfavorable factor of the precipitation arises from the deviation in amount from year to year, as from 57 inches in 1901 to

FIGURE 3.—Stillwater River, one of the tributary streams, its contiguous fields planted to pines, and bare strips of its banks riprapped, to keep its water clear and undefiled.

37 inches in 1924. The untrustworthiness might occasion drought or flood with their consequent effects, both of which would be disastrous. The relative possibilities, however, of serious drought in this type of climate are small. Nevertheless, slight deviation from the normal does become extremely important when a population increases rapidly and requires more and more water. Such an acute situation arose in 1930 and 1931. Boston had come close to the saturation level and had reached a balanced consumption. At this time drought conditions were prevalent and the reservoir attained and remained at its lowest level since construction.

The temperatures reflect the continental influence in the climate. The warmest temperatures are not sufficiently high and do not last long enough to cause excessive evaporation. The average monthly temperatures during the months December, January, and February, go below 32° but are above 20°. Although freezing takes place during these months the water does not freeze to the bottom of lakes and completely shut off the water supply.

Assured of a satisfactory water supply and a good natural location, the greatest problem faced, from a physical standpoint, was the blocking of the 300 and 400 foot channels. These passages were both closed by dams, the latter by a stone dam (Figure 4) and the former by an earthen dam (Figure 5), commonly known as the South Dike. A large aqueduct, which today carries water from this reservoir eastward to another large reservoir connected with this system, follows the former 400 foot channel.

Mixed types of vegetation mantle the watershed. The original forest cover, which contained a mixture of white pine, oak, chestnut, poplar, maple, and white and gray birches, had been denuded for cropland or for conversion into timber, or fuel. In 1916 Boylston had 52% of its area in wooded land and West Boylston had only 37%. Of 3,380 acres of marginal land acquired for reservoir purposes less than half, or 1,463 acres, were forested. To care for necessary reforestation nurseries were established for the purpose of starting tree seedlings later to be transplanted. For the most part white pines and arbor vitae, with some Scotch pines, white, Douglas and Norway spruces, maples, oaks, locusts, birches, walnuts, ashes, hemlocks, larches, and tamaracks, constitute the types of trees planted.

Numerous reasons account for the policy of surrounding forestation. In contrast to the open areas, forests insure an even run-off of the precipitation because they retain the moisture. A firm and compact land cover lessens soil erosion and prevents the silting and filling of the reservoir with great quantities of mud and gravel. The lower temperatures and the smaller wind velocities which characterize a forest area in con-

FIGURE 4.—The stone dam which blocks the Nashua River channel, with water pouring over the top in time of overflow. Most of the time, the reservoir is not filled to overflowing.

trast to a treeless region reduce evaporation. By retaining moisture in the ground, a storage basin within the soil is maintained and tends to regulate the flow of water. Snow, within a forest, remains longer on the ground because the sun, and the resultant higher temperatures, do not penetrate to the forest floor and melt the snow so quickly, another factor which aids in keeping a steady amount of water in nearby streams or reservoirs.

Hinckley and Merrimac soils, which surround the present reservoir site, developed out of the glacial sand and gravel terraces. Relatively young, they reflect the type of glacial deposition which underlies them and have no impervious hardpan layers. Their youth is due to the fact that soil-making processes have not operated rapidly because the ground freezes during a considerable part of the year. The large sand content of these two types of soil permits adequate drainage. Because both represent comparatively droughty areas, it was necessary to confine the selection of trees for marginal reforestation to those types, namely; pine, gray birch, and oak, which could survive on a small amount of moisture.

FIGURE 5.—South Dike, the earthen dam, which impounds the water at one of the ancient spillways of the old glacial lake.

The conversion of an appreciable portion of any town into a water supply basin involves many economic and social problems which may produce definite effects and less noticeable indirect results. Approximately 5,687 acres of land were bought. Four thousand and three (4,003) acres were within the limits of the town of Boylston and 1,684 within West Boylston. The land included does not indicate exactly the amount of land over which the water commission has full or partial control. The area of the Wachusett watershed covers 118.19 square miles which the water commission supervises with especial regard to drainage, even though the land has not been purchased.

The hills and uplands of the New England countryside consist, in general, of rather infertile and stony soils. Besides, the forest cover had to be removed before planting could take place and agriculture carried on to any great extent. The level terrain of the valley, of which the fertility was replenished often by silt, was easily cleared because the sparse tree growth was interspersed with much grass, and naturally the early settlers selected this large valley for settlement because their economy depended upon agriculture. They developed a type of farming suitable to the diversity of the land. On the uplands they pastured cattle and in the valleys cultivated grain. Much of the grain served as feed for the cattle which were kept primarily for dairying but were also slaughtered for meat. Boylston, especially, consisted of numerous excellent farms which raised more produce than necessary for subsistence so that the town marketed more surplus than any other town of like size in the county. With the relinquishment of 4,003 acres of land for reservoir purposes, much of the best agricultural land was lost and with it a good source of revenue. West Boylston engaged in agriculture less than did Boylston.

Although a larger amount of acreage

was obtained from Boylston than West Boylston, the latter received much more money for its property than did the former because manufacturing had developed. West Boylston was particularly favored in location with respect to streams to furnish a fairly large amount of water power. Within its borders, and wholly within the valley, a number of industries, cotton mills, grist mills, a saw and shingle mill, and a shoddy mill, had been established. Of these, two fairly large cotton mills were the most important. With the appropriation of land, these industries and a mill village were destroyed (Figure 6). As the money received for this property was not reinvested in the vicinity, capital, acquired and earned here, left the area.

FIGURE 6.—The church, the only reminder of the former prosperous mill village, Boylston. In the foreground the sand and gravel terrace of the 400 ft. stage, constitutes high level mark of the reservoir.

Not only was it necessary for industries to close down but energetic people were forced to seek a livelihood elsewhere. From 1810 to 1890 West Boylston had increased in population from 640 to 3,000, but by 1910 it had decreased more than one-half to 1,275. By 1930 the population had not reached its former peak, for at this time only 2,100 people lived in the town.

As agriculture and manufacturing tend to locate in valleys, so also do lines of transportation. The Wachusett Valley was no exception to this rule for here the rail lines and the gravel roads concentrated. When the railroad companies were forced to give up their tracks, no replacement was made and the towns were deprived of an excellent mode of transportation, an advantageous factor which might have influenced some group to organize an industry here. The gravel roads were relocated on the borders of the reservoir.

The total amount expended in the appropriation of property in the two towns approached three and one quarter million dollars. To compensate the towns for taxes deprived them by appropriation of real property for the reservoir, an act was passed to cover the deficit. It provided that the treasurer of the Commonwealth of Massachusetts, as part of the expenses of the metropolitan water works, pay to the town of Boylston, $3,000 a year and to the town of West Boylston, $12,000 a year so long as each of the towns remains a municipality. Figuring the amount received on a yearly tax rate basis this money represents a charge of less than $4.70 per $1,000. At first the reception of this lump sum of money lowered the tax rate in the towns but soon the fallacy of the supposed benefit became evident. The

exact loss can never be fully calculated but an appreciable estimate can be made. Since the acquirement of the land for the reservoir, land values have increased greatly and so too has the tax rate. Discounting any rise in land values, if West Boylston were to be reimbursed at the 1930 tax rate, the amount would have to be more than five and one-half times the amount actually received in compensation.

Both towns have had to adapt themselves to new conditions. This process was facilitated because about 1900 most New England towns were going through a period of adjustment anyway and because the improvement of general conditions mitigated economic losses. Today both towns are being occupied by people who are employed in the adjacent city of Worcester. Thus they represent suburban areas and offshoots of an urban center. If Boylston and West Boylston had not been adjacent to a large and growing city, they probably would have followed the down-hill path of many New England towns but instead they represent two pleasant, improved and modern civic communities suburban to semi-metropolitan Worcester.

# FACTORS IN THE ECONOMIC DEVELOPMENT OF BALTIMORE, MARYLAND

*Pearle Blood*

BALTIMORE was the last of the great eastern coast cities to be settled, and so gradual has been its development that few save its rivals realize that it is today one of the nation's foremost ports and manufacturing centers. Even its founders seemed scarcely to have anticipated any great growth, when they allotted to the original town in 1729 only sixty acres on a site where hills, watercourses, and marshes made it difficult to extend the settlement in any direction.

## The Demand for a Town and the Selection of a Site

Nearly one hundred years elapsed between the colonizing of southern Maryland, and the founding of the port on the Patapsco. By 1662 ships were anchoring off North Point. Here produce from either side of the bay could be conveniently taken on, for there were too few people on any one river to consume or supply whole cargoes. As population increased in the north, ships came into the Patapsco, and Whetstone Point, so-called because of the smooth pieces of "hone ore" found there, was made a port of entry in 1706. The development of an inland agricultural population, the establishing of mills along Jones' Falls, and the working of iron from the coastal plain carbonates brought by 1729 a rather considerable settlement around the Northwest Branch of the Patapsco, and made a port essential.

Middle Branch seemed to offer a better site than the Northwest. Its sheltered waters were deep enough for the ships of the time, and the land was comparatively well-drained and level. The owner of the place selected, however, believed iron to be located there, and protested so vigorously at Annapolis that he defeated the plan for a town on his land.

Excluded thus from the level land around Spring Gardens or Middle Branch, the proponents of the town sought another site, which they chose perforce on the Northwest Branch of the Patapsco just west of Jones' Falls. The northern boundary of the town ended at a "precipice" where Jones' Falls went around a horseshoe bend. This stream, which provided sites for mills, wound across a low plain subject to severe floods after heavy rains washed down the water from the Piedmont hills. Just to the west of Jones' Falls lay a great marsh, and this limited the original town on the east. The shores of the basin, as this part of the Northwest Branch was called, were low and swampy. Jones' Falls reached the Basin by two mouths at high tide and five or six at low, and so filled it with silt that shoals restricted the use of the channel on the north. Such a site has meant to the city, which developed, continual expenditure for building bridges, draining and filling marshes, leveling hills, and clearing silt from the harbor. Nevertheless, there were advantages which helped the town to persist. Here in close proximity were the light soils of the Coastal Plain, and the heavier clayey soils of the Piedmont to supply the tobacco and wheat on which the early trade was based. Communication with the interior was easy; road and building materials were close at hand; mill sites were

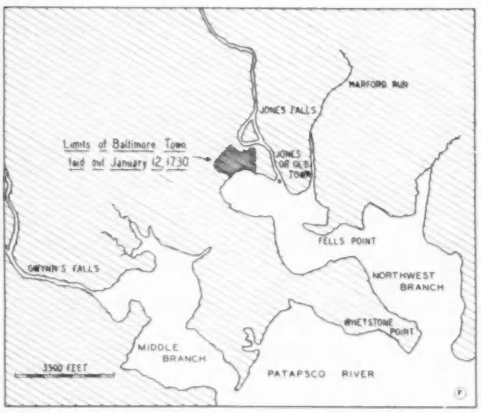



FIGURE 1.—The site and surroundings of Baltimore Town, as laid out January 12, 1730.

plentiful; the harbor was secure. As lines of inland communication developed, the advantage of the location became more apparent, though it is doubtful if the original settlers recognized its possibilities.

On the east side of Jones' Falls mills and dwellings had previously been erected, and in 1732 Jonas Town, afterward Jones' Town, was established. In 1745 an Act of Assembly provided that the settlements on either side of Jones' Falls be combined and known as Baltimore Town. Petitioners for the combination of towns represented "that the said Towns are very conveniently situated in regard to the Back Inhabitants and Navigation on the Head of the Northwest Branch of the Patapsco River." Since Jones' Town had been settled first, it was commonly referred to as "Old Town," the name by which Baltimoreans know that section of the city today. A bridge was the only connection between the towns. When the marsh west of Jones' Falls was drained, a market was built on the reclaimed land, and familiarly called "Marsh Market," a name still remembered. The old retail market no longer exists, but Maryland farmers and fishermen bring their products here in the early morning to sell to wholesalers.

## SLOW GROWTH OF THE NEW TOWNS

The new towns did not grow very fast, for in 1752 Baltimore Town could boast only two hundred people with twenty-five houses, one church, two taverns, and one brig and one sloop which ventured beyond the capes. As long as interior communications were undeveloped, Baltimore had no more advantage than any other bay town. Vessels up for freight in 1747 sometimes waited three or four months for a cargo. As the back country became settled, Baltimore increased in size and more ships began to call. The settlement of the northern and western parts of the colony contributed most to Baltimore, and it is significant that the town was founded at a time when these parts were just being opened up. Roads were built to bring the produce of the countryside to Baltimore. These highways, converging on the port, now cut diagonally across the more or less rectangular street pattern of the modern city.

The Navigation Acts constrained the new port to trade only with Great Britain or her colonies, so commerce was at first confined to the only product for which there was a demand in Europe, tobacco. Before long, however, this staple began to give way to other cargoes which forecast the future trade of the port. Annapolis port records show that in 1756 a Baltimore brig cleared for the Barbadoes carrying 1 hogshead tobacco; 3,000 bushels Indian corn; 40 barrels flour; 60 barrels bread; 2 tons iron; 3,000 staves and heading; 20 barrels pease; 14 barrels beans; 2 barrels hams. The customary West Indian cargo of sugar and rum was brought back.

The first cargo of wheat recorded as shipped from Baltimore seems to have been sent to New York in 1758 by an Irish doctor, who conceived that this

new crop from the frontier counties of Maryland, Pennsylvania, and Virginia might become a lucrative basis of trade. The success of his venture led to its repetition by others and encouraged the growth of wheat in the uplands instead of tobacco, which was more suited to the coastal plain soils. A growing demand for wheat and flour in Europe and the West Indies was followed by the building of many mills along Jones' Falls and Gwynn's Falls, and the establishment of the great milling industry of the Ellicott brothers at Ellicott's Mills on the Patapsco.

Fell's Point, which jutted out into the river offered better wharfage than the shallow basin of Jones' Town and Baltimore Town, where the water was only eight or nine feet deep. The largest ships could anchor at the point and it became a center of shipping and shipbuilding. Sea captains and merchants built fine homes there. Many investors, uncertain as to whether Baltimore Town or Fell's Point would endure, bought lots in both places. Intense rivalry existed. When Fell's Point was finally joined to Baltimore in 1773, it came in as "Deptford Hundred."

## THE DEVELOPMENT OF COMMERCE AND THE BALTIMORE CLIPPER

During the Revolution both commerce and industry received an impetus. By 1778 there were in Baltimore a linen factory, bleach yard, paper mill, woolen and linen factory, slitting mill, card mill, and two nail factories. These were mainly intended to serve the needs of the locality.

The blockade of the rival port of Annapolis helped to divert trade to Baltimore. The small fleet ships which had been constructed on the Chesapeake also helped to increase Baltimore's trading operations. In 1775 the northern colonies were able to furnish but few fast ships, and the so-called "Virginia-built" bay boats came into more extended use, though they were so sharp on the bottom that they had little hold or cargo space. They became known as "Baltimore Clippers" after the War of 1812.

From 1790 to 1812 there was a rapid growth in population and commerce, and by 1800 Baltimore had become the third commercial port. The wars in Europe interrupted agriculture there, and made a demand for wheat and flour. Colonies of European nations, cut off from the mother countries, sought American markets for their goods and bought supplies. The sailing qualities of the Chesapeake Bay boats secured for Baltimore a great portion of this trade for the clippers at that time were unequalled by boats built elsewhere. The quantity of goods brought to Baltimore was so great that auction sales became a special feature of the Baltimore market.

During the War of 1812 when the city was blockaded, trade was carried on through other ports on the Baltimore account. The Baltimore Clipper attained its greatest importance during

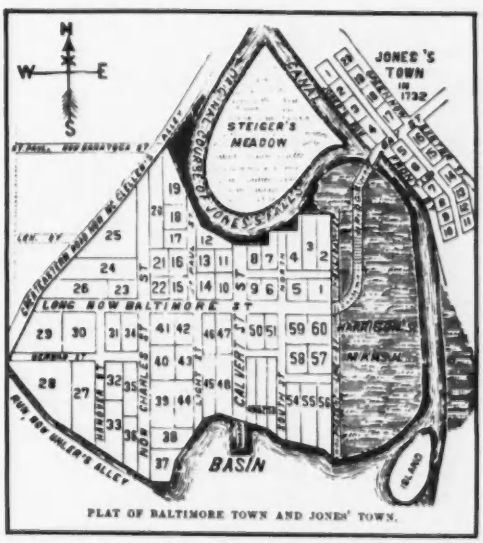



FIGURE 2.—Plat of Baltimore Town and Jones' Town. Reproduced from History of Baltimore City and County by J. Thomas Scharf.

this period, and Baltimore is reputed to have furnished more privateers and letters of marque than any other port. The war marked the decline of the reexport trade, but helped to promote home manufactures, since the city was cut off from direct foreign trade, and had streams to furnish the power needed.

### BALTIMORE'S EARLY LATIN AMERICAN TRADE

Baltimore had peculiar locational advantages for the West Indian and South American trade which thrived after the close of the war. It was easy to extend the coastwise trade southward, and even by 1810 Baltimore was trading with all the countries of the east coast. The city was forty-eight hours nearer the West Indies and South America than New York; the enterprise of a new town had not yet worn off; the Baltimore Clippers provided the carriers needed. The winter wheat raised in the Piedmont of Maryland, Virginia and Pennsylvania made a high grade of flour whose keeping qualities met the requirements of the warm climate of Brazil. This so-called "strong" flour largely accounted for Baltimore's early trade with the West Indies and South America. By 1825 there were sixty flour mills in or near the city, and Baltimore was said to be the largest flour market in the world. New York was not a serious competitor in this trade, since it handled mostly western flour which was not acceptable in Brazil. Richmond could furnish acceptable flour, but had no active demand for the return cargo, coffee, so from 1838 to 1850 Baltimore remained without an equal as an exporter of flour to South America. The lack of demand for mixed cargoes caused the loss of the import trade of a general nature and left coffee as the only import for which full cargoes were assured. Until the Civil War Baltimore's flour exports were second only to those of New York, a position held largely by virtue of the South American trade. After 1850 Baltimore handled much "Ohio" flour which was sent chiefly to Great Britain. "Susquehanna" flour was floated down the river by ark. By 1880 the large production of wheat in the West, and the development of new processes of milling "dispelled the delusion that none but our local brands were suited to tropical countries," and reduced the manufacture of flour to minor relative importance.

FIGURE 3.—Baltimore in 1752, looking from Federal Hill towards the junction of what are now Pratt and Light Streets in the heart of the city. Print made from an old drawing.

Baltimore's trade with the west coast of South America consisted of foreign

goods re-exported, and domestic dry goods. Chilean copper was an important return cargo before the 1869 Copper Act prevented its importation. Between 1850 and 1860 the most significant import from the west coast was Peruvian guano, the first commercial fertilizer widely used in this country. Baltimore was the leading market for this. There was a steady demand for the guano in Maryland and the South, where the continued use of the soil for tobacco and cotton made fertilizer essential. After 1854 a tax in Baltimore for the inspection of the guano helped to divert the Peruvian trade to New York, and bring about the importation of other less-known guanos. To establish the quality of these the shippers gladly paid for the inspection, so Baltimore recovered much of its lost trade. Baltimore's pre-eminence as an importing and distributing center for guano was broken when the South, the area of greatest demand, was isolated by the Civil War.

### THE FEDERAL HILL OBSERVATORY

On Federal Hill an "observatory" was built to serve the shippers of the time. This is the only elevation immediately overlooking the harbor, and is an outlying remnant about one hundred feet high of a Pleistocene terrace, which occurs in greater area farther inland. Masts from which canvas balloons floated indicated to merchants when their ships entered the river. The transfer of signals from a similar tower at Bodkin Point, fourteen miles from the city, made possible information of the approach of vessels still forty miles away. Federal Hill is now a city park.

### BALTIMORE'S BID FOR WESTERN TRADE

Baltimore has always looked seaward, but in common with other Atlantic Coast ports, it has also looked westward, for it soon became apparent that the capture of western trade would mean the basis of a great port business. As early as 1785 the Potomac Company was organized with Washington as president to clear the channels of the Potomac for navigation as far as Cumberland. Locks were built around the rapids and a large volume of traffic passed through the river.

FIGURE 4.—Baltimore Harbor about 1875, as viewed from Federal Hill.

When the government sought to fulfill its promise to connect Ohio with Atlantic waters, Baltimore, Philadelphia, and Alexandria bid for the proposed National Pike. The fine road system already extending from Baltimore toward the western part of Maryland and

FIGURE 5.—Sailing Day about 1875.

the short distance to the Ohio Valley by the mountain passes helped to determine the choice of Cumberland as the eastern terminus of this famous road. The commercial advantage to be gained from a connection with the National Pike was recognized, and the Frederick Turnpike was at once extended from Boonsborough to Cumberland. With the building of the Cumberland Road, begun in 1811, these Maryland roads formed a single route from Ohio to Baltimore and long gave Maryland the lead as an outlet for western trade. Lines of heavy Conestoga wagons brought eastward lumber, flour, and pork, and returned with all manner of dry goods, groceries, and other supplies needed by the frontier settlements.

The Erie Canal, rival of the Cumberland Road, was undertaken by New York in 1817. Diversion of trade seemed certain even before the canal was fully in use. With canals apparently the new order of the day, Maryland and Pennsylvania attempted to meet their competitor on equal terms. While roads were the main highways, Baltimore had the advantage, but when it became apparent that roads were to be outmoded and canals carry the traffic, Baltimore was not so fortunate, for no considerable river valley connected it with the interior.

A Maryland Commission investigated the proposal for a canal from Baltimore to Conewago on the Susquehanna. It was believed that such a canal would secure for Baltimore trade from the Susquehanna country and western New York, and that western trade could be secured via the Pennsylvania canals. This canal was authorized by the legislature, but it was never built, and in 1825 the Maryland Assembly confirmed the act of incorporation of Virginia for a Chesapeake and Ohio Canal Company. The canal was to be built along the Potomac from Georgetown to the Coal Banks above Cumberland, and was to extend ultimately to Lake Erie. Baltimore retained the right to tap the main line at some convenient point in Maryland or the District of Columbia. Some of the citizens of Baltimore were not well pleased with this plan of being on a branch canal forty miles from the real terminus. Even the building of such a canal was found to be impractical topographically, so in 1827 a meeting was held "to take into consideration the best means of restoring to the City of Baltimore that portion of Western Trade, which has lately been diverted from it by the Introduction of Steam navigation, and other causes." The committee reported that Baltimore would lose the small portion of trade left her, since New York and Philadelphia were "making such great and efficient exertions to draw to themselves the trade of the West." Baltimore was recognized as being nearer the West than Philadelphia and was believed to have the most practical route through the mountains. The committee then had the temerity to propose that Baltimore reach into the West by means of a railroad. At this time a scheme for a railroad of such great length for general

transportation purposes was indeed revolutionary, but strong measures were necessary if Baltimore was to escape commercial stagnation. Thus came about the beginning of the Baltimore and Ohio Railroad.

Baltimore's action in railroad building was followed by the paralleling of the New York and Pennsylvania canals by railroads also, and so the race for western trade continued as it does to this day.

the interior, and other terminal facilities were improved. There was a steady growth in port business with a gradual shift from South American to European trade. Public improvements were made slowly, and in 1900 Baltimore with a population of 508,957 had no sewage disposal system.

In 1904 the great Baltimore fire laid waste the heart of the business section. Though the financial loss was staggering, the catastrophe gave the opportu-

TABLE I

FACTORY DATA FROM REPORT OF COMMISSION ON ESTABLISHMENT OF MANUFACTURES

| | | |
|---|---|---|
| Philadelphia | 1 operative to 5.4 persons | $252 capital per capita |
| Wilmington | " " 5.2 " | 235 " " " |
| Boston | " " 5.5 " | 138 " " " |
| St. Louis | " " 7.6 " | 194 " " " |
| Baltimore | " " 8.1 " | 97 " " " |

G. W. Howard, *The Monumental City*, Baltimore 1873, p. 493.

## THE CIVIL WAR AND AFTER

How much trade Baltimore lost because of the Civil War will probably never be known. Maryland had become the great supply point for the South, and the volume of this traffic was a considerable factor in the city's commercial prosperity. Suspension of communication with southern customers and the liability of capture and repeated interruptions of western trade almost paralyzed Baltimore's commerce with these sections, and resulted in its diversion to other cities. South American imports, which had been carried chiefly in Baltimore-owned sailing vessels, were transferred to foreign ships to avoid the depredations of the Confederates.

At the close of the war Baltimore sought to regain her losses, and there was considerable increase in both trade and manufacturing. In 1878, however, Baltimore whose interests had always been commercial, was below the industrial average of other cities. (See Table I.)

During the seventies grain elevators were built for handling shipments from

nity to modernize one of the oldest parts of the city. Wider, straighter streets were made; modern business houses, docks, and piers were built. Baltimore continued to progress slowly until the

FIGURE 6.—Looking toward Washington Monument and Mt. Vernon Place, one of the most beautiful squares in any American city. The monument, completed in 1829 was the first in this country to be erected in honor of George Washington.

World War stimulated the more rapid development of both commerce and industry.

### THE MODERN CITY

The Baltimore of today gives evidence of its more than two centuries of growth. Narrow crooked streets in parts of the old town contrast with straight wide thoroughfares of a later period, while street names are reminiscent of every stage of growth from colonial days through the Revolution to the present. Stolid, too-neat row houses, and modern suburbs of studied beauty, quaint old houses of a bygone day, lovely doorways, bits of ironwork, and pleasant little squares all reveal changing styles in architecture and city planning from the eighteenth century to the twentieth. The population numbers old families whose names have been linked with the city since its founding, and new citizens to whom English is still a foreign language. Efficient stores with telephone and delivery services compete with the open and covered markets, where the Baltimore housewife with a great basket still makes her purchases in person. In the harbor almost under the bows of two retired schooners, modern freighters ply back and forth. The green lowlands surrounding the Patapsco grow smaller, as additional factories and smoking chimneys proclaim a new era of industrial progress.

Baltimore has spread in all landward directions from the original settlement. The city which started with 60 acres of land worth $600 has an area of 91.93 square miles and a population of 804,874 (1930 Census). Providing for growth has entailed much work and expense. Low wet lands have been drained or

FIGURE 7.—Lexington Market, now practically in the main commercial district, is built on a hillock given to the city for market purposes in 1782. It is one of the largest and best known public markets in the country.

FIGURE 8.—Characteristic type of workingmen's homes. Most Baltimore streets have trees, however, and many blocks of row houses are more pretentious with porches and yards.

filled, hills have been cut down and valleys built up until the present configuration bears little resemblance to the descriptions of the original topography. Built on deeply eroded Coastal Plain and Piedmont terraces, Baltimore remains undeniably hilly, and every few blocks an unexpected panorama of the city is spread out.

Within the city limits are considerable tracts of woodland or open areas which formerly separated outlying villages. These grew up along the main highways radiating from the port, and were taken in as the city expanded. Their street patterns are in alignment with the highways and give evidence of the independent planning of each community. Cross-communication between these once suburban sections is difficult, since public transportation facilities tend to follow the highways to the center of the city. The names and some of the former individuality of these communities has been retained, making Baltimore seem to some extent an aggregation of villages.

There is no distinctly foreign quarter, but the districts bordering the Inner Harbor have the highest percentage of foreign born, who comprised 9.2% of the total population in 1930. An additional 19.9% is of mixed parentage, chiefly German, Russian, Polish, Italian, and Irish.

Baltimore is the fourth city in the United States in the number of negroes, who make up 17.7% of the total population. During the decade from 1920 to 1930 while the white population was increasing 5.9%, the negro increase was 31.2%. This gain in the city seems to have been accompanied by a corresponding loss in the counties, and is partly accounted for by the industrial expansion during this period. Small negro communities are scattered throughout the city, but about half of the 142,106 negroes are concentrated near the center of the city, in the area surrounding the main commercial district. These neighborhoods were in many instances former prosperous white residential sections, whose owners moved farther out as business crept in. Many of the old dwellings are in a state of disrepair, and have totally inadequate sanitary conveniences for the groups now occupying them. Several areas surrounding the city's center were selected by the Federal Housing Committee for consideration in a slum clearance program.

Baltimoreans are in general well housed, and live in one-family homes rather than in apartments. Streets of row houses built of bricks with white marble steps have become characteristic. The bricks are produced locally from Coastal Plain clays, and the marble is quarried in the Piedmont, a few miles north of the city. In some poorer districts wooden steps are painted white, apparently in imitation of the marble, and require likewise hours of scrubbing. Many of the newer blocks of row houses, however, lack this distinctive Baltimore feature.

FIGURE 9.—The character of the land along the streams makes its use for residential or commercial purposes difficult, but its natural beauty makes it desirable for parks.

In the last two decades with the readier means of transportation, population in the outlying residential districts has increased greatly with a loss of population, and empty buildings resulting in the downtown areas, so that Baltimore has become a city suffering somewhat from decentralization.

The streams which cross the city have for the most part served their day as mill sites. Along three of them where steep valleys have been cut in the underlying crystalline rocks, are public parks. Jones' Falls in its lower course is now walled in and covered by a road, so that its floods are no longer feared. Through it water from storm sewers discharges into the basin.

Unlike many port cities, Baltimore has not reserved any considerable part of the waterfront for park use, or made a waterfront drive. A small area on the Patapsco used by yacht clubs is public, and the Federal Government maintains Fort McHenry as a park. Recently Fort Armistead and Fort Smallwood were acquired by the city, and the latter is being developed somewhat, but these areas are far down the river away from the crowded parts of the city, and are not easily accessible.

The harbor, once comprising only the shallow waters of the basin, now includes the Patapsco and its tributaries, and has become one of the most important industrial harbors in the United States, unexcelled by any in the import of raw bulk materials for its basic industries. An almost undissected Coastal Plain terrace rising only 10 to 20 feet above tidewater borders all the branches of the Patapsco. It affords sites for factories, room for ground storage, piers and warehouses and permits the railroads to meet the ships. It has been necessary to fill much of this land, and a heavy rain and southeast wind occasionally send water over into the streets border-

TABLE II

SHORTEST RAIL DISTANCES IN MILES

| *From* | *To* | | |
|---|---|---|---|
| | *Baltimore* | *Philadelphia* | *New York* |
| Akron | 429 | 456 | 550 |
| Buffalo | 404 | 406 | 390 |
| Chicago | 767 | 814 | 890 |
| Cincinnati | 560 | 644 | 724 |
| Cleveland | 444 | 490 | 562 |
| Columbus | 479 | 545 | 621 |
| Detroit | 604 | 637 | 631 |
| Fort Wayne | 621 | 668 | 744 |
| Grand Rapids | 713 | 770 | 776 |
| Indianapolis | 650 | 723 | 799 |
| Kalamazoo | 683 | 730 | 774 |
| Lansing | 654 | 701 | 707 |
| Louisville | 688 | 772 | 852 |
| Pittsburgh | 313 | 360 | 426 |
| St. Louis | 891 | 964 | 1040 |
| Toledo | 548 | 595 | 668 |
| Wheeling | 336 | 403 | 480 |
| Youngstown | 378 | 424 | 500 |

Data from "February Sailings," issued by Export and Import Bureau, February 1936.

ing the basin, but these disadvantages are minor. Not far from the inner harbor or basin are the wholesale and financial sections with the main commercial district just to the north. The heavy industries or those depending largely on water-borne commerce for the shipment and receipt of materials seek the waterfront. Some of the larger of these utilize the more distant sections, chiefly the Sparrows Point, Fairfield, and Curtis Bay areas.

## THE LOCATION OF BALTIMORE

Baltimore is 170 miles from the Capes and double this distance must be traveled

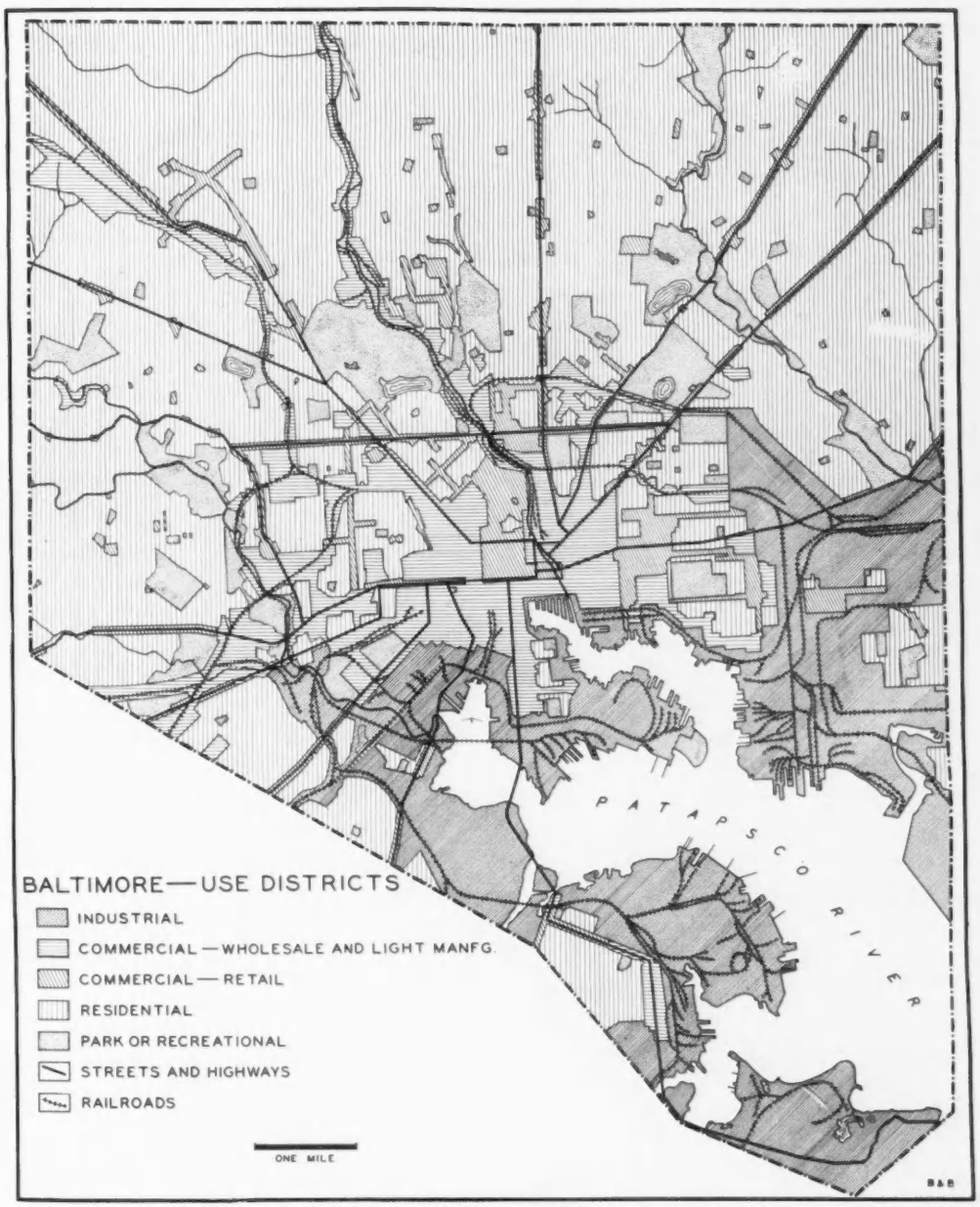



FIGURE 10.—The modern city of Baltimore, and its environs, represents an adjustment to the site and situation typical of Atlantic coastal cities but possessing distinctive attributes of its own.

FIGURE 11.—Location of Chesapeake and Delaware Canal.

by ocean-going ships serving the port. To the early settlers this seemed too great a disadvantage to be overcome, and they expected a port nearer the ocean to become the metropolis of Maryland. But, being far from the ocean makes Baltimore nearer the interior, a fact which was appreciated as soon as the interior was settled and products from the West sought the coast. The difference in distance between the Atlantic ports and the Middle West is reflected in the long-established but often-contested rail differentials. The competition apparent from the beginning between the eastern ports was augmented by the intense rivalry of the railroads as these carriers reached into the West. The New York Central, the Erie, and the Delaware, Lackawanna and Western had terminals in New York, the Pennsylvania in Philadelphia, and the Baltimore and Ohio in Baltimore. Each railroad tried to get traffic through the port of its primary interest, with a rate war ensuing that threatened their very existence. Grain was the traffic most sought. In 1877 the railroads made an agreement fixing the differentials on east and west bound traffic as between New York, Philadelphia, and Baltimore. Since 1898 the Interstate Commerce Commission has been repeatedly petitioned to have these differentials abolished or modified. The rates have been revised, but the differentials remain. On westbound traffic Baltimore's rate is from three to eight cents per hundred pounds below New York's, while Philadelphia's rate is from two to six cents below; on eastbound traffic Baltimore's rate is three cents under that of New York, while Philadelphia's is two cents. Within the classification territory is the country's most extensive industrial area. Efforts to change this rate are almost continual, and Baltimore is constantly called upon to defend its advantage, which is of particular value in the importation and distribution of bulk products.

An attempt to overcome the disadvantage of Baltimore's distance from the sea was made with the construction of the Chesapeake and Delaware Canal. This was a 10-foot locked canal completed in 1829 as a private project, but acquired in 1919 by the Federal Government and converted into a sea-level waterway without locks. The canal is narrow and crooked, and has a depth of only 12 feet. For years Baltimore tried to get it deepened and widened so that coastwise vessels and ocean freighters could be safely accommodated. This improvement was incorporated in the 1935 Rivers and Harbors Bill, and has been approved by government agencies. Work is already half done, and the improved canal will probably be ready for use in 1937. Widening the canal from 90 to 250 feet, and deepening it from 12 to 27

feet will permit its use by 96% of the ships calling at Baltimore, and will probably influence the routing of at least 45% of the port's shipping. The canal will cut a day off the sailing time between the city and northern and European ports, and will place Baltimore for the first time on a major trade route.

TABLE III

| *From Baltimore to* | *Via Chesapeake Capes* | *Via C & D Canal* | *Saving via Canal* |
|---|---|---|---|
| Philadelphia ..... | 380 | 94 | 286 |
| New York ..... | 413 | 265 | 148 |
| Boston ..... | 640 | 486 | 154 |
| European ports ..... | 3,480 | 3,365 | 115* |

* Average decreased distance to Scandinavian, Mediterranean and Continental ports when clearing via C and D Canal, compared with Chesapeake Capes. Distances in nautical miles. Data from "Baltimore", July 1935.

The depression has made it increasingly hard for ships to obtain full cargoes in any one port, thus necessitating several calls. Under these circumstances it is uneconomic for ships to make the 170-mile voyage up the Chesapeake and back. With the canal Baltimore can reasonably expect greater call service, which is one of the needs of the port.

Baltimore's location in about the center of the Atlantic Coast has helped to make it an important distributing center with over 1,600 wholesale and jobbing houses serving especially the South and Middle West. For South American trade or trade coming via the Panama Canal, Baltimore is more favorably located than the other major Atlantic ports.

The port is far enough south to have rather moderate winters in which there is usually little trade interference from ice.

The long distance of Baltimore from the ocean and the narrow entrance to the bay at the Capes tend to make an almost negligible tidal variation of fourteen inches. This does not interfere with loading or unloading at any time, and permits ships to enter or leave the harbor without delay.

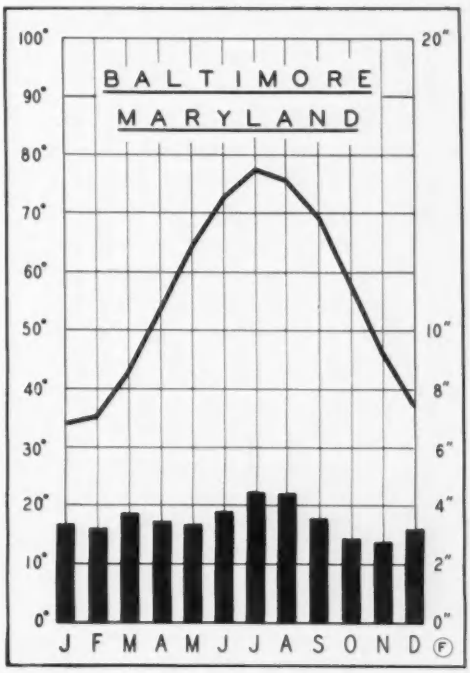



FIGURE 12.—Average monthly temperatures and precipitation for Baltimore, Maryland.

## BALTIMORE'S HARBOR AND INDUSTRIAL DISTRICTS

The irregularity of Chesapeake Bay, the result of the drowning of an ancient river system, gives a maximum of waterfront within a small geographical area. Thus Baltimore on the tidal estuary of the Patapsco has room to accommodate all types of shipping and ample space for future expansion. Baltimore's harbor has not been classified, but each division has its own characteristics.

### THE BASIN OR INNER HARBOR

The basin remains today the most familiar part of the waterfront, for it penetrates far into the city, and brief views of piers and shipping may be had from many points in the business section. Ferries to the Eastern Shore and excursion steamers to bay resorts leave from here. The present basin is only about half its original size for shoal areas around the edge have been filled in. In-

deed, filling in the whole basin by levelling Federal Hill was once seriously proposed, but fortunately not carried out. Water Street, where the United States Customs House now stands two blocks from the harbor, once faced the water.

The piers lining the basin are chiefly of wood construction. Some along Light Street look very old and dilapidated, while those along Pratt Street are more modern and substantial, since they were rebuilt after the Great Fire of 1904.

FIGURE 13.—View across the upper Basin which extends into the heart of the city. Bay boats and coastwise fruit boats are characteristic sights.

Most of these are municipal piers rented to private companies. The basin has a depth of 24 feet maintained by the city, and is used by bay and coastwise shipping. Bay boats bring cargoes of fruit and vegetables from Maryland and Virginia shores, and carry back general merchandize. Banana boats dock here, for Baltimore is a heavy importer of this fruit. The city has now provided new pier sheds and berthing space for rental to the fruit companies and these additional facilities should increase the business brought to the port. Cargoes for use in Baltimore or nearby regions are placed on trucks for immediate delivery. Fruit destined for the interior is loaded directly into freight cars brought alongside the boat, so there is no expense of rehandling. Some lumber, passenger, and general cargo coastwise boats have their terminals in the inner harbor. There are many wholesale and commission houses in this area. Residences are in general of rather a poor type, and the trend of population is away from this section.

### FELL'S POINT

Fell's Point, once the shipbuilding and deep water part of the harbor and a place of fine residences, still gives evidence of the past. The names of the streets—Thames, Fleet, Shakespeare, George—suggest the English origin of the first settlers. The rows of red brick houses, with sloping roofs and dormer windows, which are scattered throughout the area, date back to the late eighteenth or early nineteenth century. Sailors' lodging and eating houses are common. On the

waterfront are oyster and fruit packing houses, where masted bay boats discharge their cargoes at the factories' doors. Fell's Point has the highest percentage of foreign-born population in the city, drawn here, no doubt, by the possibility of securing work in the factories around the harbor.

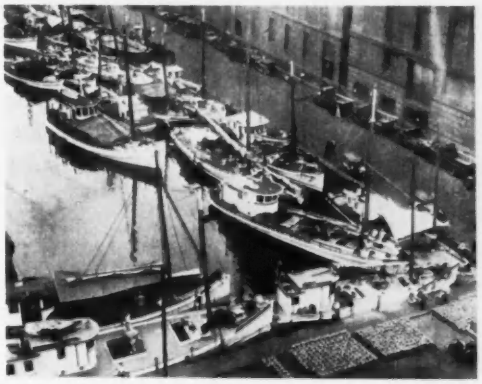


FIGURE 14.—These small Chesapeake Bay boats bring fruit and vegetables to Baltimore in the summer, and oysters in the winter. Wholesale dealers buy from them.

### LOCUST POINT, PORT COVINGTON, AND CANTON

In 1934 there was a proposal to assess high dockage charges at railroad piers against vessels using such facilities. This brought an immediate protest from Baltimore, for 99 of the piers and wharves handling most of the city's overseas and coastwise traffic, are owned and controlled by the three trunk lines which serve the port, and the Canton Railroad. The largest marine terminals are those of the Baltimore and Ohio Railroad on Locust Point facing Northwest Branch. On the opposite side of this point of land, formerly Whetstone Point, and fronting on Middle Branch is Port Covington with the McComas Street terminals of the Western Maryland Railway. Here are some of the most modern terminal facilities in the country, built and owned by the city of Baltimore, but leased to the railroad for thirty years with the privilege of extension.

The Pennsylvania Railroad piers are in Canton opposite Locust Point; in the same district are the piers of the Canton Railroad. This section of Baltimore was supposedly named Canton in 1785 by a sea captain who returned with a cargo from that port in China. Peter Cooper owned this part of the waterfront when he invented the Tom Thumb engine. The area was later acquired by a stock company. The Canton Company today owns about 1,500 acres of land and maintains piers, wharves, and warehouses, and thirty-one miles of trackage connecting with the three trunk lines at the flat Baltimore rate of freight.

At each of the terminals 35 feet of water permits the accommodation of the largest freighters; the level land makes it possible for the railroads to meet the ships. Apron tracks extend along the sides of the piers to allow direct loading of heavy cargoes, thus eliminating time and expense involved in trucking and rehandling goods. There is plenty of space for waterfront warehouses, yards for storage of thousands of freight cars, and ground storage for bulk cargo. Great grain elevators at these terminals have a combined capacity of about 12,000,000 bushels. A gallery system with conveyor belts and loading "legs" or chutes allows rapid loading of grain as general cargo is being taken on. At the Western Maryland and Canton terminals there are electrically operated ore cranes. Each railroad has its own coal loading pier. By an extensive car float and lighterage system, cargo is delivered between the railroads and the water where direct delivery from car to ship is not practical. No cartage transfer is necessary. A municipal belt line railroad serves the Inner Harbor and connects the railroads.

Workers' homes are found near each of these terminal areas, particularly in Canton, a manufacturing as well as a shipping center. The company leases or sells factory sites, and Canton has become one of the largest industrial areas of this character in the United States. Among its industries are oil refineries, fertilizer plants, copper smelting and rolling plant, steel rolling mill, can factories, electric cable plant, and an automobile assembling plant.

FIGURE 15.—Airplane view of the Baltimore and Ohio Railroad grain elevator and marine terminals at Locust Point. The large amount of level land bordering deep water gives space for warehouses and for storage of hundreds of freight cars. In the right background can be seen Fairfield and part of the industrial district around Curtis Bay. (Courtesy of Baltimore and Ohio Railroad.)

### DUNDALK AND SPARROWS POINT

Farther south Dundalk and Sparrows Point are associated with airplanes, ships, and steel. These communities are in the Baltimore industrial district, but not within the corporate limits of the city.

### CURTIS BAY AND FAIRFIELD

Curtis Bay is definitely an industrial community, and was developed as such with none of the graciousness apparent in the older parts of the city. The bay is a somewhat circular body of water about a mile and a half in diameter. The town is long, narrow, and depressing, sandwiched between gray factories which line the water, and hills which rise rather abruptly on the west.

Fairfield to the north occupies a low swampy peninsula. Industrial plants border the water, but there are few homes. Through both of these areas the air is heavy with odors. Acrid yellow fumes from chemical plants, and low squat oil tanks are characteristic. Fertilizers, chemicals and alcohol are made here. There are great oil refineries and distributing centers, lumber wharves, shipbuilding plants and dry docks. In general the industries are those using large quantities of heavy water-borne materials which they unload at their own private wharves.

## COMMERCE OF THE PORT

It has been estimated by the Export and Import Bureau that "15% of the population of the city directly or indirectly receives its support from some form of port activity." In the decade preceding 1932 the commerce of Baltimore remained relatively stable. For seven of these years Baltimore was the nation's third port in total foreign trade tonnage, and in 1926 second place was attained due to an abnormally large coal export. In 1932 there was a sharp falling off of the trade of all ports. Baltimore was the third foreign trade port for the 1936 fiscal year.

From 1927 to 1931 Baltimore was the second United States port in import tonnage, a position regained in 1934.

The largest single contributor to import tonnage is the great ore group with iron ore from Chile, Cuba, and Europe, manganese from Brazil, India, and Russia, and pyrites from Spain. Much of this import is used in the Baltimore industrial district.

Petroleum comes from Mexico, Columbia, and Venezuela. Baltimore is an important distributor of this product, much of which also reaches the city by pipe line, coastwise steamer and tank car, especially since the tariff on oil was imposed. The raw sugar which comes from the Philippines and Cuba is refined in a great seaboard refinery. Molasses from Cuba and the Dominican Republic is unloaded by pipeline into tanks to be converted into alcohol. A large part of the fertilizer materials, nitrates from Chile, potash from Germany and Belgium are used in Baltimore. Woodpulp comes chiefly from the Scandinavian

FIGURE 16.—Air view looking across the Fairfield district toward the Upper Harbor.

TABLE IV

TOTAL TRAFFIC OF THE PORT

| | *Annual Average 1922–1931* | | *1934* |
|---|---|---|---|
| | *Per Cent* | *Tonnage* | *Tonnage* |
| Imports | 24.6 | 4,303,422 | 3,519,205 |
| Exports | 14.5 | 2,528,261 | 712,744 |
| Coastwise receipts | 14.4 | 2,514,276 | 4,483,625 |
| Coastwise shipments | 9.4 | 1,644,659 | 1,452,537 |
| Internal receipts | 7.2 | 1,253,183 | 930,664 |
| Internal shipments | 8.0 | 1,404,160 | 1,782,758 |
| Local traffic | 21.9 | 3,833,505 | 3,453,874 |

Averages from Port of Baltimore, Md., pp. 287–290. 1934 data from Annual Report 275, U. S. Shipping Board and Report of Chief of Engineers, U. S. Army, 1935.

countries, and much of it is distributed to the pulpmills of the Middle West.

It is strikingly evident that most of the volume of imports is made up of bulk cargo. Baltimore's own basic industries create a demand for such materials; its position is favorable as a routing terminal for imports to other coastal or interior cities; a large amount of room is available for storage; rapid mechanical facilities for handling ores, sulphur, grain, coal, and fertilizer materials have been developed; many of these bulk products come from a southerly direction so that Baltimore is the nearest great Atlantic port. These factors combined with the favorable freight rates on westbound traffic operate to make Baltimore the chief concentration point on the coast for bulk cargo.

The bulk of Baltimore's export trade in the past has been coal and grain. The coal figures above are unduly high, since the period averaged includes 1926 when there was a coal strike in Great Britain. Export prices were not low enough, however, to retain the market temporarily gained. Drought and depression have combined to decrease the country's grain exports. Probably half the grain formerly handled by Baltimore came from Canada. The preference given by Great Britain to grain shipped via Dominion ports has reduced this source of export, so that Baltimore's great grain elevators are being used to only a small part of their capacity.

Baltimore has less advantage in freight rates on eastbound traffic than on westbound. Boats after leaving Baltimore commonly go to New York to complete their cargoes, so that many shippers send their goods there directly, the small increase in freight being offset by the saving in time. Baltimore is dependent in the main on slow steamship services, and this works to its disadvantage as an exporting center. The influence of steamship lines on port business is shown by Baltimore's apple export, which rose from nothing in 1930–31 to 339,000 barrels a year later, when proper shipping facilities were provided. The economies and efficiency of the port, and the enterprise of its citizens are bringing a gradual but steady improvement in shipping services. At present fifty-five steamship services operate vessels on regular schedule in essential foreign and domestic trade routes. The opening of the enlarged Chesapeake and Delaware Canal will undoubtedly bring greater regularity and speed of service from the port of Baltimore, and help to produce well-balanced cargoes in both directions.

The character of Baltimore's coastwise receipts and shipments is much the same as that of its imports and exports, and suggests the city's industries. The effect of the tariff on oil is reflected in the decreased foreign and increased domestic trade in this commodity. Baltimore has the advantage of being the nearest major Atlantic port to the West Coast via the Panama Canal, and in outbound cargo ranks above New York. Almost daily sailings of vessels in the intercoastal service give evidence of the importance of this trade.

### BALTIMORE AS AN INDUSTRIAL CITY

Baltimore has always been prominent commercially, but it came to the front as a manufacturing center during and after the World War, when many of its old industries were expanded, and new ones were established almost overnight. In 1914 the city ranked eleventh in value of manufactures; in 1919 it ranked seventh, a position it maintained for several years. The advantages of the city as a port and as a central seaboard distributing center, the proximity of the coals of Maryland, West Virginia, and Pennsylvania, the hydroelectric power from the Susquehanna, the active interest of

the municipality in its industries and the favorable labor conditions have contributed to this advance. Living expenses are reported as lower than in any other large city except Cincinnati. In 1930 50.3% of all Baltimore families owned their own homes. This high percentage of home ownership tends to make a large permanent population and to stabilize labor conditions. Baltimore is the only large city within a considerable area, and therefore draws labor not only from the metropolitan district, but from surrounding counties and states as well. Much of the common labor and most of the domestic help come from the large colored population.

In 1933 steel works and rolling mills employed more wage earners and had a larger value of products than any other industry in the district. Other ranking industries were clothing manufacture, making of tin cans and tinware, meat-packing, printing and publishing, manufacture of fertilizers, making stamped and enamel ware, canning, manufacture of alcohol, liquors and chemicals. In some of these lines environment and circumstance have combined to make Baltimore outstanding.

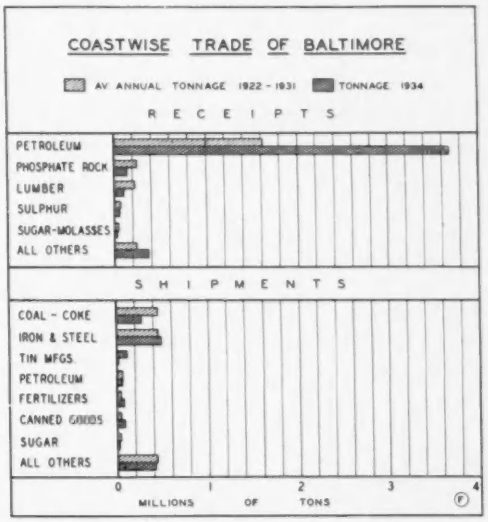



FIGURE 17.—Foreign trade of Baltimore.

## FERTILIZER INDUSTRY

The fertilizer industry had its beginning in the early guano trade and Baltimore's advantageous position as a supply point for the South. Eighty-five per cent of the fertilizer used in the United States is consumed in the Atlantic and Gulf States. Oyster shells, lime, menhaden, fish and crab scrap are available in Maryland for fertilizer, and Baltimore's location has made the receipt and use of heavy waterborne materials easy. The fertilizer plants today are concentrated in Canton and around Curtis Bay, where the dust and odor are remote from the crowded parts of the city. At Curtis Bay where the largest plant is located, phosphate rock from Florida and pyrites from Cuba are unloaded directly at the plant's wharves. Sulphuric acid is made and mixed with crushed phosphate rock to form superphosphate, the basis of all commercial fertilizers. This is sent to other plants to be made into complete fertilizer. Much of the sulphuric acid is sold to the Bethlehem Steel Company at Sparrows Point. The pyrites run 60% iron after the sulphur has been burned out, and these are sintered and ferried to the steel plant also. In 1933 there were fifteen fertilizer plants operating in Baltimore, which has become the largest fertilizer center in the world with a sale of fertilizer and fertilizer materials amounting in a good year to $25,000,000.

## IRON AND STEEL INDUSTRY

Maryland apparently had iron furnaces in 1715, and was exporting iron two years later. The ore was produced locally from the iron carbonates found at the western edge of the Coastal Plain, much of it coming from Whetstone Point and around the mouth of Gwynn's Falls. Charcoal was used in the furnaces with oyster shells or limestone as

the flux. Some peculiar quality of the carbonate ores made iron of exceptional strength, which was much in demand. When the Alabama and Lake Superior deposits came into the field, great furnaces were built manufacturing iron with coke more cheaply than the charcoal iron could be made. The introduction of steel reduced the market for high grade iron to a minimum, so that the local industry in Maryland was almost extinct by the close of the eighties.

The largest employer of labor in the Baltimore district today is the Bethlehem Steel plant at Sparrows Point. The plant was established in 1887 to utilize iron ore from Cuba. Baltimore offered good tidewater location for furnaces within easy distance of coking coal. The intention was to ship the product of the furnaces to Pennsylvania for conversion into steel, but development of methods for direct use of molten pig iron led to the building of Bessemer works and rolling mills. In 1915 the area and works were acquired by the Bethlehem Steel Company and expanded to their present size. Sparrows Point is owned and completely dominated by the great steel plant, and nowhere is it possible to get out of its sight or sound. Since only foreign ores are used, the advantage of the tidewater location is apparent, and its future importance may be surmised. There are other rolling mills and iron and steel manufacturing plants in the city.

One of the products of Sparrows Point is tinplate. Large quantities are shipped, and the Baltimore area itself is one of the largest consumers of tinplate in the country. Cans, tin boxes, and decorated tinware are manufactured.

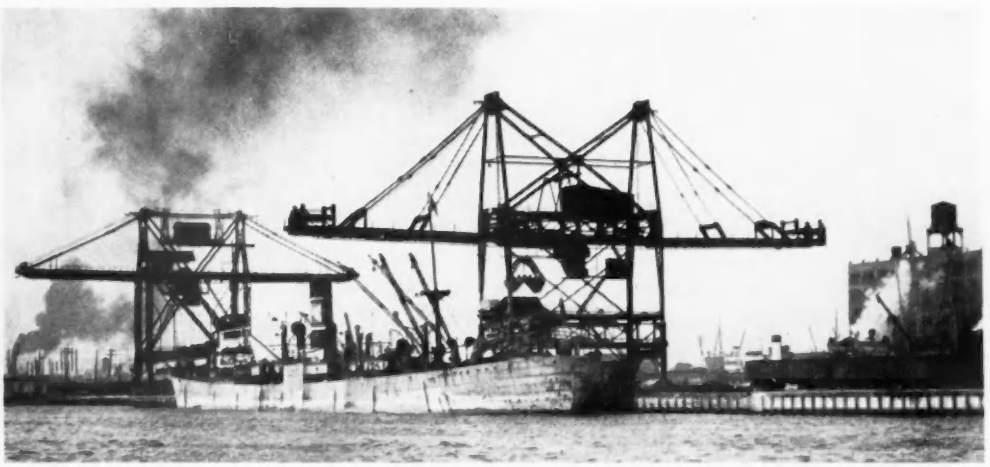


FIGURE 18.—Bulk cargo handling cranes holding records for rapid discharge of ores and sulphur. The grab buckets lift sixteen tons and transfer cargoes directly from ship to freight car. The Canton industrial area is in the background. (Courtesy the Cottman Company.)

### CHEMICAL INDUSTRIES

Chemical industries had an early start. The discovery of chromite near Baltimore in the early nineteenth century was followed by the manufacturing of chrome compounds in which Baltimore had the monopoly for over forty years. Though the deposit of chromite was relatively insignificant, its discovery and use at a time when other deposits were unknown was important in localizing the manufacture of chemicals in Baltimore.

### CLOTHING MANUFACTURES

The manufacture of clothing is a major industry in Baltimore, which is

far enough south to have some of the advantage of the cheaper labor of that section, and near enough the great industrial population of the North to serve that market economically.

### AVIATION

Baltimore is already one of the country's chief aircraft manufacturing centers. Comparative freedom from fog and ice, and proximity to the great population centers and the military markets of Washington are some of the factors affecting the localization of this industry. The city, anticipating this new development in transport, and hoping to figure in transoceanic traffic, is building a great municipal airport in the Dundalk section. A bulkhead has been erected, and the area behind it has been filled, largely with silt from the harbor deepening project. The nature of the construction makes this a highly expensive airport, but one which technical experts say will be well adapted to the requirements of both land and water flying.

### CANNING

Canning in Maryland began in 1840, when oysters were first packed in Baltimore, and was soon extended to fruits and vegetables. For the next twenty years the industry remained in an experimental stage. The Civil War increased the consumption of canned goods thus helping to remove public prejudice and stimulate better methods. Baltimore in 1933 had thirty-six canneries, and is one of the chief canning cities in the United States. Canning crops rank high as a source of cash income to Maryland farmers, particularly in the counties bordering the bay, where the long growing season and light easily worked soil are favorable to the growth of fruits and vegetables. Products from adjacent counties are brought to Baltimore by truck, but large quantities of fruits and vegetables are brought in by bay boats, which tie up alongside the factory wharf to discharge their cargoes. Many factories are in the Fell's Point and Canton areas. Tomatoes, spinach, green and lima beans, peas, and sweet potatoes are the chief crops canned.

Although the demand for canning labor is, in general, highly seasonal, a number of factories give nearly year-round employment to part of their help, for oysters are canned during the winter months. Many oysters are packed raw in containers, and are sent out iced. At the end of the oyster season, shucking boxes are removed, and the factory is cleaned and made ready to begin on spinach, the first of the vegetable crops to come in.

Closely allied with the canning industry is the manufacture of tin cans. Some of the largest can factories in the country are located in Baltimore where there is a local demand for the product, and from which distribution to other

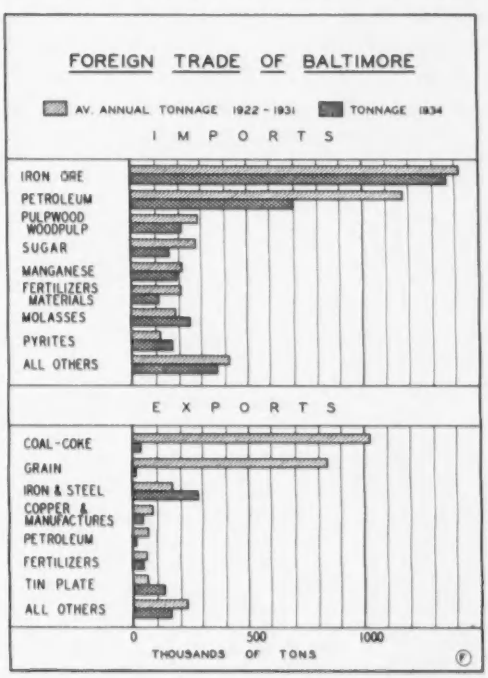



FIGURE 19.—Coastwise trade of Baltimore.

nearby canneries is easy. Paper cartons and wooden packing cases are also made in the city.

Maryland canned goods are sold in all parts of the United States, but principally in New York, Pennsylvania and the densely populated industrial East.

### COPPER ROLLING AND REFINING

In 1929 Baltimore was the chief copper smelting city in the world, refining approximately 20% of the world's copper. Prominence in this field seems to be largely due to an early start. Shortly after 1800 a copper rolling mill was in operation on the Gunpowder River near Baltimore, and in 1844 other copper works were built on Locust Point, now occupied by the marine terminals of the Baltimore and Ohio Railroad. A colony of smelters was brought in from Wales, and ore from the United States and Chile was used. The company, with which prominent Baltimore merchants were identified, had some mining scheme in Cuba in mind, but it never materialized. It probably was instrumental, however, in locating the industry in Baltimore. The company subdivided and a new plant was built in Canton. The Welsh smelters found ore and coal of high quality, so that they were able to produce uniformly good copper, superior to that they had made in Wales. The brand of "Baltimore Copper" could be relied on and became famous. The plant was "Americanized" in 1880, and the old Welsh colony no longer exists as such. The ore at present comes chiefly from Utah and Nevada, where the company has mining interests, though some foreign ore is also used. Copper has for many years been one of Baltimore's principal export commodities.

### BALTIMORE TODAY

More than 2,000 separate commodities are manufactured in Baltimore. It has never been a one-industry city, and the diversity of its manufacturing has helped it during the critical depression period. The location of factories built during the early stages of our industrial history was more or less dependent upon the local market. As better transportation facilities widened the market possibilities, and competition became keener, manufacturers paid more attention to the selection of a location where economies of operation and distribution were greatest. The industrial expansion which occurred in Baltimore during the World War and immediately thereafter was not due to the development of any one industry, but to growth in varied lines, and involved the investment of capital from many outside sources. This practical recognition of Baltimore's advantages, and the character of the expansion should contribute to future industrial stability, while the shipping requirements of the industrial plants serve to strengthen the commercial tradition. Baltimore is not a boom city. It is a major port and industrial center, the product of more than two hundred years of stabilized growth in which the calm progressiveness of its citizens and geographic environment have played leading parts.

NOTE.—The Export and Import Bureau of the Baltimore Association of Commerce has given valuable assistance in securing information and pictures.

# BOOK REVIEWS

ROWE, J. W. F. *Markets and Men. A Study of Artificial Control Schemes in Some Primary Industries.* ix and 259 pp.; maps and pictures; index. The Macmillan Company, New York. 1936.

During the past twenty years every portion of the world's economic system has suffered severe strains and stresses. This is especially true in that portion which deals with the production and marketing of foodstuffs and raw industrial materials. In the period marked changes have taken place in the chief sources of supply, in the mechanization of production in many forms, in the application of science in numerous ways, in the effects on rising and falling standards of living, in changes in social habits and customs, and especially in the appearance of many restrictions and valorization schemes of national and also of international or world-wide extent. The schemes have become an intricate part of the everyday life of men, women, and children the world over. By them the retail price of most commodities has been affected in one way or another.

The manner in which some of the valorization schemes has been applied and the degree to which they have succeeded or failed is the theme of this valuable little volume. The author treats especially the control schemes for the following six commodities: coffee, wheat, sugar, American cotton, rubber, and tin. It is written at a level that makes it understandable by the lay-reader. Some of the major conclusions set forth by the author are so sound from all points of view that they are worth-while repeating here.

(1) "Restriction is economically *unsound* as a means of meeting a permanent decline in the demand for the product of a particular industry during times of general prosperity and is more than likely to intensify the difficulties of the inevitable readjustment of resources; but in times of general depression it may be justifiable until general recovery is under way, since in the depths of a depression the readjustment of resources will probably present the maximum of difficulty."

(2) "Restriction is economically *sound*, as a means of meeting a temporary decline in the demand for the product of a particular industry, both during times of general prosperity and of general depression, provided that no substantial proportion of the productive capacity is in an advanced stage of obsolescence, this proviso being of special importance if there is any tendency towards excess capacity before the demand declines."

(3) "Restriction can at no time be a cure for troubles arising from excessive capacity, unless the productive technique of the industry in the widest sense of that term is virtually stationary—a condition which is nowadays most unlikely to be fulfilled. In times of general prosperity, a resort to restriction where this condition is not fulfilled will be useless, and is extremely liable to make the necessary readjustments still more difficult. But in times of general depression, the difficulties of readjustment are at a maximum and therefore a restriction scheme may be legitimately used, as a means of postponing such readjustment until general trade recovery is sufficiently far advanced to minimize the loss and dislocation inevitably involved."

The volume is highly recommended for a careful reading by the politician, the business man, the geographer, the economist and also the consumer, all of whom should give much more study to the methods of artificial control of production and distribution of our basic foodstuffs and raw industrial materials and to the effects of these methods.

CLARENCE F. JONES

HANKE, LEWIS (Ed.). *Handbook of Latin American Studies.* xv and 250 pp.; index. Harvard University Press, Cambridge, Mass. 1936.

The *Handbook of Latin American Studies* is an outgrowth of a conference of scholars interested in Latin American studies held on April 27, 1935 in the offices of the Social Science Research Council in New York City. Sixteen scholars served as contributing editors in preparing the bibliographical material on publications in 1935 on Latin America on anthropology, ethnology, economics, geography, history, law, and literature, aided by the generous effort of many friends and organizations. The Handbook is an excellent record of important publications in the various fields listed above with prefatory notes by the contributing editor in charge of the section and annotations to individual references. To all students interested in Latin American affairs the Handbook will serve as an excellent guide to recent publications in the different fields. It is hoped that future editions will carry longer prefatory notes and perhaps a number of special articles.

CLARENCE F. JONES

PARKINS, A. E., AND WHITAKER, J. R., EDITORS. *Our Natural Resources and Their Conservation.* 22 contributors. Published by John Wiley & Sons, Inc. New York. 1936. Price $4.00.

"Our Natural Resources and Their Conservation" fills a real need in our colleges and universities. For many years the importance of the geographic approach to conservation has been recognized. Those of us who offered work in

this field have been greatly handicapped, until the publication of the present text. Now more and more courses in conservation are being given and it is hoped that the slow process of education will in time insure the adoption of wise conservation policies.

The need for intelligent conservation has never been more apparent than it is today. Careless use of our natural resources has already caused shortage and the increased prices of several important raw materials. The wise utilization of natural resources is the duty of all nations. It is appropriate that the geographer play a major rôle in dealing with these vital national and international problems.

The text is divided into ten parts each designed to treat a different field of conservation. The first section, by Wallace W. Atwood, deals with the history of the conservation movement and the many problems both public and private, associated with the growth of federal conservation policies. For those who are not acquainted with the beginning of our national conservation program under Presidents Harrison, Cleveland and Theodore Roosevelt, this chapter serves as an excellent summary. Starting with the first withdrawal of forest lands in 1891 the story is traced through to the establishment of the Civilian Conservation Camps, the Soil Erosion Service, National Resources Board and similar agencies, under the present administration.

Part II of the text is composed of eight chapters. The first of these, "The Public Domain and Its Disposal" by Stephen S. Visher, although statistical in nature, is essential to subsequent discussions. "The Soils of the United States," by Louis A. Wolfanger, treats the formation of soils, their classification and the need for a soil conservation program based upon economic appeal. Dr. Wolfanger's effective presentation of the scientific aspects of soils prepares the student for the chapter on "Soil Erosion and Its Prevention" by H. H. Bennett. This phase of conservation is of particular interest today because of the active soil erosion program being conducted by the federal government. It is possible to enrich the discussion of this chapter with field trips to Erosion Experiment Stations or local watershed demonstration areas.

In the remaining five chapters of Part II various methods of accomplishing wise use of our lands are introduced. J. Russell Smith discusses, in his pleasant style, the possibilities of adapting tree crops to certain lands now being destroyed by erosion. He emphasizes the importance of applying the scientific method in determining the type of crop best suited to different areas. Ralph H. Brown in a chapter entitled "Utilization and Conservation of Our Arid and Semi-arid Lands" analyzes the irrigation question and points out the dangers in dry farming and other methods of utilizing semi-arid lands. Dr. Brown calls attention to the need for rehabilitation of misused grasslands and the desirability of restricting new irrigation projects. V. E. Shelford and H. C. Hanson follow up this discussion with a chapter on "Grasslands." They show how unwise practices have damaged tremendous areas within our midwestern prairies. The authors advocate the acquisition of native grassland reservations where observations and experiments may be carried out, looking toward the adoption of a wiser policy of grassland economy. "Reclamation of Wet and Overflow Lands" is treated by George J. Miller. Maps and tables show the amount and position of drainable land in the United States as well as the location of present drainage enterprises.

The final chapter of Part II by O. E. Baker is entitled "The Agricultural Prospect." Numerous graphs, maps and tables supplement a well balanced treatment of this very important phase of conservation. Doctor Baker emphasizes the close relationship between agricultural and population problems. In his closing paragraphs he makes the following statement: "The past should be recognized as worthy of respect and study, and the future as more important than the present. This is the essence of conservation."

Part III consists of two chapters on forests and forest conservation by J. R. Whitaker. A series of maps showing forest regions, distribution of forests and the value of forests for watershed protection accompanies this section. The author discusses fire protection, logging methods, planting, disease and insect control, utilization of wood waste, taxation and other phases of modern forestry. The student cannot fail to appreciate the vital need for a sound up to date forest policy.

Problems relating to water supply, water power, navigation and flood control are discussed in Part IV. Robert M. Brown in a chapter entitled "Water Supply for Domestic and Industrial Use" gives special attention to the problems encountered by large cities in obtaining adequate water supplies "Water Power and Its Conservation" is handled by Frank Williams. The maps, graphs and tables accompanying this section are especially good. Map assignments, based upon the information supplied, have proved to be valuable supplementary work for the students. The problem of steam versus water power is clearly and effectively discussed.

"Our Waterways and Their Utilization" by A. E. Parkins, the third chapter in Part IV admirably demonstrates the value of the historical approach. An analysis of the early development and later decline of our inland waterways supplies an excellent background for discussion of such enterprises as the Great Lakes-St. Lawrence Seaway, the Intracoastal Waterway, and the New York Barge Canal. To complete the treatment of water conservation there is a chapter on "Floods and Flood Control" by Guy-Harold Smith. The first half of the chapter is devoted to a thorough study of the causes of floods while the second half deals with the methods of control and the various agencies coöperating in flood prevention.

"Our Mineral Treasures" by William H. Haas and "Mineral Fuels" by Nels A. Bengtson constitute Part V of the volume. These chapters forcefully demonstrate the need for mineral conservation. In the space allotted the authors have presented a wealth of valuable information. However, if instructors do not supplement their text books with material from outside sources the treatment of minerals is rather brief. Mineral fuels are adequately and effectively covered.

Part VI consists of a short chapter by Helen M. Strong on "Conservation of Natural Resources and the Manufacturing Industry." The close relationship between manufacturing and conservation is well expressed in a quotation from Doctor Strong—"Since manufactured products contribute to and are inextricably united with the American standard of living, conservation of our natural resources forms the keystone for sustaining a sound and progressive manufacturing industry and a progressive American life." Although brief the chapter introduces a very vital conservation problem and serves as a basis for a rich classroom discussion of industrial geography.

The many difficulties confronting conservation of wildlife are ably set forth by V. E. Shelford. In addition to a complete survey of wildlife conditions today the author presents several plans for accomplishing preservation and conservation of our wildlife resources. The need for game refuges, buffer zones, and control of reservations is emphasized.

A chapter by Edward C. Prophet on "Recreational Resources" points out the growing demand for more and more recreational areas. The author discusses the National Forests, National Parks, State Parks and other reservations which supply esthetic as well as recreational values to the public. Closely related to this important phase of our study is conservation of human resources. Very little has been written on this subject and consequently the brief chapter by Ellsworth Huntington comes as a welcome contribution to the text. When it is realized that the largest number of American youths are produced where geographic and social conditions are least favorable, the need for improving these less-favored regions is apparent.

The last part of the volume is devoted to a consideration of National, State and local planning activities. Loyal Durand, Jr., in a chapter on State and Local Planning discusses the need for a carefully organized state planning program based upon regional methods.

In the closing chapter, George T. Renner presents various types of regional planning intended to aid in the development of National Resources. He stresses the need for a long-term national planning program under the direction of a permanent planning board.

The organization of the text makes it possible to shift the order of presentation to suit the instructor. This has proved effective in several institutions where the text is now being used. The variety of style and differences in opinion brought about through the coöperative authorship has likewise been helpful. Instructors who wish to supplement the material in the text will find the selected bibliographies for each chapter very useful.

WALLACE W. ATWOOD, JR.

STAMP, L. DUDLEY. *A Commercial Geography.* viii and 460 pp.; maps and diagrams. Longmans, Green and Co., London. 1936. Price, $2.50.

The publishers state that *A Commercial Geography* "is intended for the general reader, for those preparing for such professional examinations as the Institute of Bankers, and for the upper forms of Secondary Schools." Doctor Stamp echoes the purpose when he says that he might "dedicate this book to the twenty-five thousand bankers—and others—the study of whose efforts when facing their professional bankers has inspired me to put before their successors what I believe to be some of the essentials of the subject."

Throughout the study the author has succeeded quite well in carrying out what he considers the function of geography—"to classify and standardize common knowledge concerning the countries of the world and concerning the relationships between the life of man and his environment." Having the general reader in mind Doctor Stamp wisely devotes the first three chapters to "The Modern Viewpoint," "The Geographical Factors" and "Environments" thus building a background for what is to follow. Succeeding this foundation, chapters on "Commodities," "Mineral Commodities" and "Power" give the student a "commodity approach," while "The Geography of Settlement" and "The Geography of a Manufacturing Industry" stress geographic principles in population distribution and manufacture. Chapters nine and ten prepare the reader for the second division of the book, a study of the commercial geography of the great powers and other political units. This change from commodity to country approach gives the reader two geographical viewpoints. Consideration of political units is followed by a chapter on trade routes and the final section contains ten pages of questions which may help the student preparing for examinations.

Doctor Stamp has given much more space to the British Empire than to any other political entity, a stress which might be excused for several reasons. Yet it seems hardly justified to give twenty pages to British India, while China receives but nine, and the whole continent of South America but thirteen. In short the author might be criticized for giving undue space to some countries whereas his treatment of others is short and somewhat encyclopedic.

Again, while the volume may be praised for its many excellent maps and graphs, a critical geographer may wonder why the cartographer

omitted from his map, "Deciduous Forest Lands," the deciduous forests of Eastern United States and other significant regions while including areas in British Columbia and Southern Chile. Moreover, on the map, "The Coniferous Forests," great coniferous sections in Northwestern United States, British Columbia, Southeastern United States, and elsewhere were left out. The preceding criticism and the one in the paragraph above, however, are merely to call attention to minor faults in the book. On the whole, Doctor Stamp has succeeded well in his original purpose.

EARL B. SHAW

LEE, HOON K., M.S., PH.D., *Land Utilization and Rural Economy in Korea*, A Report in the International Research Series of the Institute of Pacific Relations. Kelley and Walsh, Limited, Shanghai, 1936. 9″ by 6″, 302 pages.

There has long been a need for a book on the geography of Korea, "The Heart of the Far East," which would combine information from authentic sources with personal scientific research. The work of Dr. Hoon K. Lee, a Korean with an American and Japanese education, does much to fill this need. This is one of the series of land utilization studies around the Pacific which the Institute of Pacific Relations has been sponsoring. The title is somewhat inadequate, for the author has also included all of the factors in the geographic landscape. It is natural, however, that he should stress agricultural conditions, since the farm population makes up "80.8 per cent of the total population."

The first half of the book is of particular interest to geographers. The initial chapter deals with general conditions and gives a good picture of the geographical elements. The discussion of the monsoon-influenced climate and of the complex geologic structure is especially valuable. In the section on industry is revealed the firm position of the Japanese who gained complete control of the peninsula in 1910 and now "own nine-tenths of the total capital investment in industry." The adverse condition of foreign trade shows that eventually all the wealth in any form will be drained from the Korean farmers. The study of population is very complete, including a dot map, and stresses the density of 160 persons per square mile of total area, or 1,158 persons per square mile of arable land.

The characteristics of Korean agriculture are dealt with in the second chapter under such headings as crops, domestic animals, farming methods, and farm layout. The best contribution in this division is a series of dot maps showing the distribution of the thirty principal crops of Korea. These support Doctor Lee's contention that from the standpoint of agriculture there are really only two regions, roughly equal in area; Northern and Southern Korea with the division along the southern boundaries of South Pyengan (Heian, in romanized Japanese) Province and South Hamkyung (Kankyo) Province. The separation is supported by the differences in crops grown, in the farming methods, and in the single cropping in the north due to the bitter cold winter, and the double cropping which is possible in the south.

The third chapter deals with the land utilization, past as well as present. For example, land use statistics for 1404 A.D. contrasted with the present show that the cultivated land has increased 4½ times while the population has multiplied 56 times. The most important feature of the chapter is a chart of the land use under 19 headings by the 13 provinces and by ownership adapted by Doctor Lee from government statistics for 1930. To summarize some of these figures, 78% of the total area is in forest land, 13.3% in dry fields, and 7.56% is paddy fields. In regard to ownership 38.2% is public-owned land, 40.7% is non-taxable private land, and 21.1% is taxable private land.

The latter half of the book deals mainly with rural economy from which one gains the unavoidable impression of the severe economic conditions under which especially the poorer classes suffer. Government control over the forests and the efforts toward reforestation are summarized. There are brief accounts of the mining of gold, iron, coal, and graphite. The cities of Korea and their development due to administrative needs rather than commercial importance is also mentioned.

Doctor Lee has engaged in a field survey as well as a critical examination of government statistics to prepare material for this book. The results of this field survey are especially valuable for they furnish a check and a supplement to the Japanese government publications. Those familiar with the chief of these, the Annual Reports on Administration of Chosen, will realize that, aimed for tourist and foreign consumption, they naturally tend to stress those factors which have shown great material progress, thus giving only part of the picture. The latest of these reports, more elaborate than its predecessors with many pictures and maps, especially worthy of note, is entitled, "Thriving Chosen" (Foreign Affairs Section, Government-General of Chosen, Keijo, Chosen, October, 1935, 94 pages).

It is unfortunate that pictures could not have been utilized to supplement the 132 tables and 47 maps and to give visual impressions of the more salient points. Although there is an index, the lack of a bibliography other than the footnote reference is a minor fault. Doctor Lee should be especially complimented on his handling of the delicate subject of Korean-Japanese relations. He has written from an impartial viewpoint and presented the facts as he found them. This position was perhaps forced upon him by censorship, but in spite of it there is a definite feeling of an informed personality behind the book, impersonally as it is written.

The book, although completed in 1932, was not published until 1936. Thus it appears before the companion studies of Japan by Dr. Shiroshi Nasu of the Tokyo Imperial University and of China by Dr. J. Lossing Buck of the University of Nanking. When completed this series, of which the work by Doctor Lee is an important part, will be an invaluable source of accurate information about Eastern Asia.

SHANNON MCCUNE

ANDREWS, JAMES M. *Siam, Second Rural Economic Survey 1934–35.* viii and 396 pp. Peabody Museum, Harvard University, 1936.

The first rural economic survey of Siam was performed in 1931 under joint auspices of the Siamese Government and the International Council of Missions, and the results were published by the Bangkok Times Press in 1931 ("Siam Rural Economic Survey" by Prof. Carl C. Zimmerman). The second survey of the years 1934–35 of which this volume is a record, was made by a Siamese survey party and the results were given to Harvard University for study and publication. The author, Mr. James M. Andrews, served as consultant to help plan the survey. The volume forms merely a preliminary analysis of the economic data and further, more detailed publications will follow.

Approximately forty villages were selected for this survey and in all—except three—forty households were studied. Geographically five units were distinguished: namely, Northeast Siam, South Siam, North Siam, Central Siam, and Southeast Siam. Northeast Siam covers the Korat Plateau, a rather level sandstone region, sunbaked and arid in the dry season (winter), partly flooded during the time of the summer monsoon. The inhabitants are Lao people, who grow glutinous rice, chiefly for home consumption. Fishing is important along the Mekong River and its branches, and the high parts are used for grazing. South Siam is the Siamese part of the Malay Peninsula, where only the narrow coastal lowlands are cultivated. Thai people live in the northern part, while Malays are in the majority toward the border of the Malay States. Here again agriculture is chiefly for home purposes and is supplemented by fishing. The northern valleys of the Menam River system comprise North Siam. The study only includes the Lao villages in the valley bottom and excludes the interesting economy of the upland tribes. Subsistence agriculture prevails generally; the important lumber industry (teak) is not included in the study. Central Siam is the rice region par excellence. Here live the Thai people who grow rice on the summer-flooded delta plains. Finally, Southeast Siam (for which only two villages were surveyed) contains the lowlands south of the Cardomon Mountains along the Gulf of Siam. It is agriculturally different from Central Siam; spices (pepper) and fruits rank next to rice in importance.

The survey is complete; it discusses such items as farm costs, income from crops, farming profits, fishing, animals, rentals of buildings and land, investments, handicrafts, labor, trade, expenditure for food, clothing, and domestic and agricultural credits. While it is impossible to evaluate the results obtained, it seems worthwhile to quote the final conclusion: "These three factors —constructions of inland highways, development of the Port of Bangkok, and continued expansion of coöperative societies—seem outstanding in their importance to Siamese economic development today."

SAMUEL VAN VALKENBURG

SCHEU, ERWIN (Ed.) *Wirtschaftsgeographische Probefahrten.* Publications on economic geography of the University of Trade at Königsberg, East Prussia. Vol. I. 1936.

This first issue of geographical publications of the Königsberg University contains a number of short studies, parts of theses of graduate students. Most of the studies have chiefly local (German) interest but some cover topics which may be of interest to American geographers. Among those is a study by Mr. Bleyer on the "Cotton Production of the Anglo-Egyptian Sudan"; although short it covers the problem rather well, and deserves attention.

Another one, by Mr. G. Woelk, gives an economic-geographical interpretation of Jamaica but it is too short to be of much value. The chief significance of the publication lies, however, aside from the information which it contains, in the fact that it gives foreign geographers an insight into the work done in geography in Germany by the students themselves, and may lead to comparisons with methods used elsewhere and the results obtained.

SAMUEL VAN VALKENBURG

HERMANN, ALBERT. *Atlas of China.* Harvard University Press, Cambridge, Massachusetts. 1935.

Doctor Hermann, professor of historical geography in the University of Berlin, is a prominent German authority on China, and his maps have been drawn and printed in Germany under his direction. Although most of the maps are historical, Doctor Hermann includes a number of geographic, which deserve the attention of geographers. They include a physical map which shows the various types of loess cover in the north, and the extent of present and former forests, and a series of economic maps. The economic map of Manchuria and Mongolia brings out interesting facts about the distribution of cultivated land and of forests, but lacks precision on the type of crop; only wheat, rice, and soy

beans have been taken into consideration while the Kaoliang Italian millet and common millet, which represent the largest crop area, are entirely left out. Similar agricultural weakness is shown by his selection of crop maps of China representing the valuation of conditions in 1918, while C. C. Chang's work, published in 1932, is more up-to-date and based on a greater amount of information. Valuable are the maps on mineral resources and of manufacturing industries, as well as the large map on traffic and communications. In spite of the objections raised, the Atlas is of geographical use for colleges and universities where the geography of China is taught. It is, as far as I know, the first effort to give a series of detailed maps in English on this very important part of Asia.

SAMUEL VAN VALKENBURG

VON SCHUMANN, HANS JOACHIM. *Changes in Location of British Manufacturing Industries Since the War.* Verlag Julius Beltz. Langensalza, Berlin, Leipzig. 1936.

The shift in the location of manufacturing industries of Great Britain since the war brings out some interesting points. Before the war the importance of exports favored the coastal coal fields, and the major industrial developments had a tendency to adjust their location to that factor. Post-war decline of exports, and, consequently, greater stress of the home market brought the southern inland coal fields more into prominence as nuclei of manufacturing industries. A second reason for the shift was the increase of the use of electric power and the so-called "national grid" which gave industrial possibilities independent of the location of coal fields. The result has been a migration from the northern to the more southern manufacturing districts. The following is a short résumé of the results of Doctor von Schumann's work for the various main industries.

I. Iron and Steel

Decrease of importance of Scotland and the northern districts; increase in Lincolnshire and the eastern Midlands. In Lincolnshire concentration in the manufacturing of agricultural machinery and implements, while the Midlands have a great variety of production which helped them through the depression.

II. Ship Building

Concentration towards the Clyde, where the large units have replaced the formerly smaller developments.

III. Motorcar Industry

Centre of production in western Midlands and Greater London.

IV. Copper and Brass Industry

Increasing concentration toward Birmingham and Leeds.

V. Wool

Decline of small centra and strengthening of the Yorkshire district.

VI. Cotton

The share of Lancashire in the manufacturing of cotton has grown to 83.7 per cent. Inside the Lancashire district is strongly visible a migration of the industry towards Manchester and away from the northern districts (Blackburn, Burnley, and Bury).

VII. Chemical Industries

Increasing importance of Lancashire-Cheshire with favorable relation to Manchester. Also increase along the northeastern coast (nitrogen) while the importance of Scotland for chemicals is decreasing except for explosives.

VIII. Rubber Industry

Concentration in Staffordshire and around London.

IX. Leather

Increased prominence of Greater London and of Lancashire-Cheshire.

X. Ceramics

Likewise concentration of Greater London and Lancashire-Cheshire.

XI. Paper Industry

Tendency of shift towards the London district.

XII. Artificial Silk

Four centres, namely:

1. Around Manchester
2. In harbor cities (Lancaster, Lowestoft, Burton, Grimsby)
3. Greater London
4. Yorkshire and the Midlands.

XIII. Radio

Concentration around London and in western Midlands.

The study itself can be recommended. Its major disadvantage is that the last year taken into consideration is 1929 and one wonders what has happened since.

SAMUEL VAN VALKENBURG

AMERIKANISCHE LANDSCHAFT. Edited by Erich von Drygalski (Ozarkland by Rudolf Schottenloher; Kanadische Prärie, by Max Eichmeier; Florida, by Peter Berger; Jamaica, by A. William Küchler; and Seattle, by Homer L. Seeger). viii and 532 pp., numerous tables, charts, maps, and illustrations. Walter de Gruyter & Co., Berlin and Leipzig, 1936. Price, RM 26.

This impressive book contains five geographical studies made under the direction of Doctor von

Drygalski of the Geographical Institute of the University of Munich. Financial coöperation of former students made this publication possible. Four of the five studies are on the North American continent, while one gives a geographical interpretation of the Isle of Jamaica. The high standard of the work presented justifies a brief review of each one separately. The value of content and the beauty of execution are examples of the high level of geography in Germany and the willingness to spare no cost in order to give publications an attractive appearance.

*Die Halbinsel Florida.*—Doctor Berger has used his stay in Florida during 1929–30 to decided advantage, and his complete study of the geography of this peninsula brings up almost a feeling of shame that such a study is published by a foreigner and has not been taken up in the same thoroughness by an American geographer. It is striking to observe the strong tendency towards the physical background; indeed, here it is strongly overdone; of the 100 pages, almost 70 treat the physical base. The description of the physiography is excellent and cannot be too strongly recommended. In 40 pages a complete physiographic picture of Florida is given, enriched by many maps and pictures. The human use of the Florida environment is rather disappointing after the thoroughness of the physical base. Agriculture could have been discussed more in detail while the rapid recent development is not taken into consideration. Florida changes so fast that any publication based on material gathered five or six years ago is no longer up-to-date. This applies still more to the tourist industry which shows a new trend unforeseen in the years Doctor Berger did his field work. But even those disadvantages do not change the opinion expressed above, that the study is a direct contribution and deserves to be read by American geographers.

*Jamaica.*—Doctor Küchler, who knows the island of Jamaica personally, may be congratulated on his excellent geographical study. In fact it may be regarded as a rather perfect study of island geography as far as is possible in 100 pages. Well balanced in the length of its subdivisions and also well written, it gives a complete picture of Jamaica. Half of the space is used for physical background; geology, climate, physiography, and natural vegetation. The second part includes land utilization, settlements, population, industries, trade, and finally the political-geographical significance of the island. While only praise can be given for the written part, it is to be deplored that so few maps illustrate the article. The only two maps given are a geologic map by R. T. Hill and a rainfall map by Maxwell Hall, both of ancient date. The rainfall map certainly could have been improved upon if the much greater number of present stations had been taken into consideration. The lack of a general reference map makes the reading, for people not personally acquainted with Jamaica, difficult, while a map of land utilization—as for instance that of Whitbeck—would have been a definite asset. The pictures with the article are well chosen and beautifully printed. If this study could appear separately, translated into English, and with good maps, it would find a large circulation, which it certainly deserves.

SAMUEL VAN VALKENBURG

*Ozarkland.*—In the best German tradition of thoroughness and integrity of research, Rudolph Schottenloher summarizes within the limits of 125 pages the regional geography of the Ozarks, that rugged highland which constitutes one of the best delimited and most interesting of the distinct physiographic units of American landscape. Not since the early, masterly work on that region by Carl Sauer has anything so general or so thorough been attempted; comparisons are ever odious, but it must be confessed that though different and up-to-date, this later treatise of the Ozarks fundamentally is not a notable improvement in any sense over Sauer's adequate work.

Due space and emphasis are given in Part I to the geologic structure and history, and consequent land form and attributes of terrain, that constitute the genetic foundation of geographic landscape. Part II is devoted to the relationship of the area to the Interior Plains—the climate, the forest and the prairie vegetation, the course of the "New Civilization."

Half the treatise, Part III, is regional, discussions of the middle mountain section, the borderlands on the north and northeast, the central and western high plain or plateaus, and the highlands of the south, briefly but effectively presented in still smaller subdivisions.

Each of the smaller subdivisions is characterized by its distinctive qualities or activities, vignettes upon the general background of the Highland. A rather comprehensive bibliography and satisfactory index complete the section.

*Die Kanadische Prärie als Wirtschaftsraum.*—The fascinating Canadian prairies, fascinating in their pristine attributes as well as in the process of their occupancy by man and their subjugation to his activities, receive their just measure of attention from the vigorous mind and pen of Max Eichmeier. Much more popular, not nearly so statistical and technical, not nearly so complete and exhaustive in treatment, as the series on "Canadian Frontiers of Settlement" of which at least six volumes have already appeared in the program which the Canadian Pioneer Problems Committee has carried on for the last half decade with the financial support of many institutions and organizations, this discussion complements that excellent publication, and affords a general view that is of primary value to any survey of the region.

Rather well illustrated by maps, charts, and photographs, the text moves along fluently and convincingly with all the freshness and naïveté of first impression, untrammeled by fixed technique

or formal fact, unhampered by the conservatism of long acquaintance and familiarity. Contrasted with Ozarkland, it naturally and more appropriately emphasizes the human phases of the landscape—the folk, their origins, their migrations, their problems, their economic and social evolution. The development of the landscape as a phenomenon or pattern of agricultural utilization occupies a goodly, reasonable share of the treatise. It is a wholly satisfactory discussion, within the limitations imposed by acquaintance with the field, and by space available.

*Die Pazifische Küstenstadt Seattle.*—More formal and general, less satisfactory and stimulating than the other, more naturally appealing or alluring sections of the book, the urban geography of Seattle by Homer L. Seeger concludes the volume. Probably because of its more rigid limitations both in area and in material, the subject receives less refreshing treatment than the other parts of the book. It appears more conventional, more restrained, more "old-worldish." The physical and biological background are so violently compacted as to lose their distinctions, their true patterns, and the text achieves encyclopedic character, rather than geographic unity; it is descriptive rather than interpretative.

Though it suffers somewhat by contrast with the other sections, chiefly because of the character of the subject matter, the Seattle section does have noteworthy merit as an example of what may be done by a trained geographer, a scientist to whom the discipline of his science means something definite and distinct, when he has the opportunity to lay the foundation for his research upon the sound basis of personal work in the field he discusses. The section is a sound climax to the series, despite its brevity.

W. ELMER EKBLAW